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ASTOUNDING

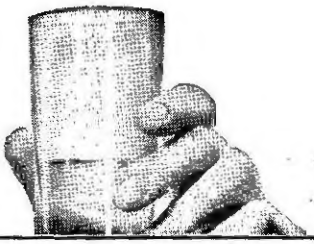
REG. U. S. PAT. OFF.

Science-fiction

MARCH 1946
25 CENTS

PATTERN FOR CONQUEST

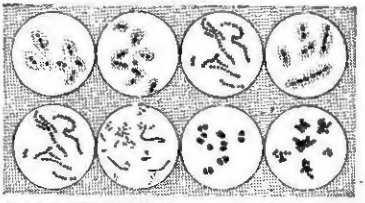
BY GEORGE O. SMITH



Germs Reduced up to 96.7% in Tests

Fifteen minutes after a Listerine Antiseptic gargle, tests showed bacterial reductions on mouth and throat surfaces ranging up to 96.7%, and up to 80% one hour after a Listerine Antiseptic gargle.

"SECONDARY INVADERS"



TOP ROW, left to right: Pneumococcus Type III, Pneumococcus Type IV, Streptococcus Viridans, Friedlander's Bacillus. BOTTOM ROW, left to right: Streptococcus Hemolyticus, Bacillus Influenzae, Micrococcus Catarrhalis, Staphylococcus Aureus.

How Listerine Antiseptic can help to head off a Cold or lessen its severity

WHEN you feel a cold coming on, it's likely to be a sign that a virus has infected you and that millions of germs called the "secondary invaders" are threatening a mass invasion of your tissues through throat membranes.

That's the time to "baby" yourself a bit and get started at once with the Listerine Antiseptic gargle regularly. Here's why:

Kills "Secondary Invaders"

Listerine Antiseptic reaches way back on throat surfaces to kill millions of the "secondary invaders", . . . the ugly germs, according to some authorities, that cause so much of the misery you know so well.

Often this prompt, delightful precaution may halt the mass invasion of these germs and nip a cold in the bud, so to speak.

Fewer Colds in Tests

If your cold has already started, the Listerine gargle, taken early and often, may help reduce the severity of the infection.

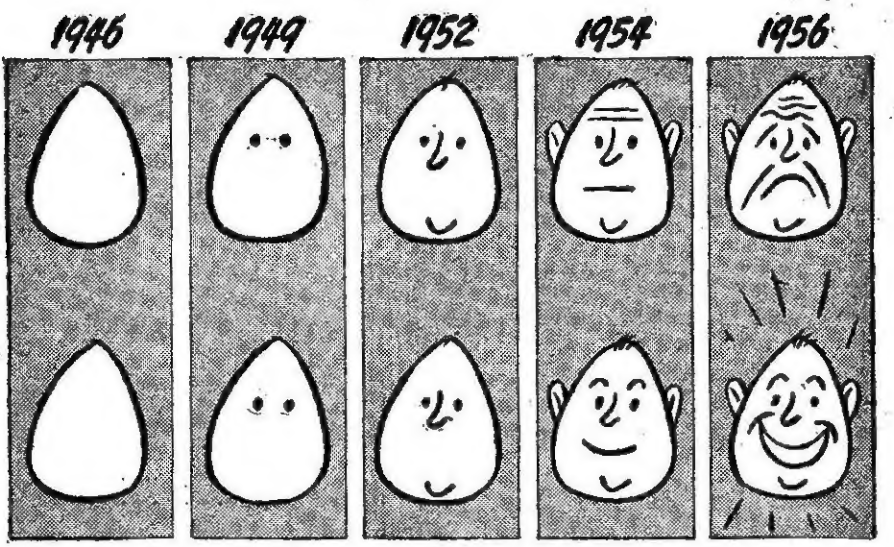
Bear in mind Listerine's impressive record made in tests over twelve years: Those who gargled with Listerine Antiseptic twice a day had fewer colds and usually milder colds than those who did not gargle . . . and fewer sore throats.

So, when you feel a cold coming on, eat sparingly, keep warm, get plenty of rest, and gargle with Listerine Antiseptic. It may spare you a lot of trouble.

LAMBERT PHARMACAL CO., *St. Louis, Mo.*

THE SAFE ANTISEPTIC

FOR ORAL HYGIENE



Two ways your face can grow in the next few years

SUPPOSE financial matters are constantly on your mind.

Suppose you know that there's practically no cash reserve between you and trouble.

It would be surprising if your face didn't show it.

But suppose that you're putting aside part of everything you earn . . . that those dollars you save are busy earning *extra* dollars for you . . . that you have a nest egg and an emergency fund.

Naturally, your face will show *that*, too.

There's a simple and pretty accurate way to tell which way your face is going to go in the next few years:

If you are buying, regularly, and holding as many U. S. Savings Bonds as you can, you needn't worry.

Your face will be among the ones that wear a smile.

Buy all the Bonds you can... keep all the Bonds you buy!

STREET & SMITH PUBLICATIONS, INC.

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Concerning The Atomic War

When the Second Atomic War starts—the first began on August 6th, and ended very shortly—it will bring into play a weird and terrible system of delicate international balances.

In the first place, any way you play it, the United States is Target Number One. If the would-be aggressor wants to gobble up his neighbor, the United States must be eliminated before it's safe to carry on a private fight anywhere. Several recent world wars have demonstrated conclusively that if the United States is not incapacitated at the start, the aggressor eventually feels the full weight—the finally crushing weight—of American disapproval. Therefore, in an atomic war, the United States must be paralyzed with the first blow, whether the U. S. is the principal target or not.

But it's a positive certainty that, however badly the American industrial machine, transport machine, political, industrial and economic machine may be smashed, the stored atomic bombs will be safely tucked away in a few hundred deeply buried, widely scattered burrows. The United States, completely smashed, will be the most deadly military power on Earth. We'll have more atomic bombs than anyone else; we've started accumulating them now.

That fact imposes some peculiar limitations on the actions of the would-be aggressor. *The United States can't be invaded.*

The only hope any aggressor might have of profiting, of even coming out of the war in vaguely coherent fashion, will be that the terrible vengeance of the United States does *not* strike. Any invasion would automatically sign, seal, and deliver notice as to just who it was that murdered the 40,000,000 Americans who died.

The attacker dare not invade. The robot atomic rocket bombs must not in anyway reveal their source. They can come in across the North Pole, heading due south to New York, and due south to San Francisco, from some attacking nation due south of the North Pole. They may be made by machine tools purchased in Switzerland, cut from iron bought in Sweden, bearing vacuum tubes made in Holland, in sockets assembled in Chicago. But they won't bear any marks of the user. They probably will even be wiped free of fingerprints.

The United States won't be defeated in war. It won't even be murdered. It will be assassination in the dark. Leaving a strange corpse armed with a terrible weapon—and aching with a terrible ferocity to use that weapon on the rats that wiped out 40,000,000 Americans. *And not knowing who committed the crime.*

The aggressor's hope will be that we blame the wrong nation, attack some other nation or nations, and thereby loose a world chaos from which the aggressor can, perhaps, pick up some juicy fragments.

Think, for a moment, of the horrible tension that will grip the whole planet—the frantic, futile, boiling terror in every city on Earth, in every national capitol in the world. The United States is going to strike back—*but at what nation?!* The sheer, absolutely intolerable tension of those nightmare hours. . . . Americans in deep-hidden atomic launching sites raging to strike back . . . nations around the world on hair-trigger, tension-screaming nerves . . . every one, everywhere, waiting for someone, somewhere and anywhere, to make just . . . one . . . move. . . .

It can't last long. When the explosion is over, the aggressor, if he succeeded in escaping identification, stands an excellent chance of coming

(*Continued on page 178*)

Pattern For Conquest

by

GEORGE O. SMITH

First of three parts. The Earth has been menaced by galactic conquerors before, in science-fiction. But not quite this way—and not with quite these results. For instance, consider What is the purpose of war? How determine the winner?

Illustrated by Kildale

I.

The signal officer leaped from his position and made a vicious grab at the thin paper tape that was snaking from his typer to the master transmitter. It tore just at the entrance slot. The tape-end slid in; disappeared.

The master transmitter growled as the tape-end passed the scanner. Meters slapped up against the overload stop and two of the big rectifier tubes flashed over. Circuit breakers came open with a crash down in the power room, and up in the master modulator room the bell alarms rang, telling of the destruction of one of the tuning guides from overload peak.

The signal officer paid no attention to the damage his action had caused. He grabbed for the telephone and dialed a number.

"I want confirmation of messages forty-eight and forty-nine," he snapped. "What fool let 'em get this far?"

"What happened?" asked the superior officer mildly.

"I got forty-eight on the tape before I came to forty-nine," explained the signal officer. "I grabbed the tape just as it was hitting the master transmitter. The tape-end raised hell, I think. Default alarms are ringing all over the building. But who—?"

"It was my fault—I'll confirm in writing—that forty-eight was not preceded by an official sanction. You were quite correct in stopping them at any cost. As soon as the outfit is on the air again, send 'em both."

"Yeah, but look—"

"Orders, Manley."

"I'll follow 'em," said Signal Officer Manley, "but may I ask why?"

"You may, according to the Book of Regs, but I'm not certain of the reason myself. Frankly, I don't know. I questioned them myself, and got the same blunt answer."

"The whole terran sector has been slaving for years to keep this proposition from happening," grumbled Manley. "For years we have been most careful to stop any possible slipup. Now I find that the first time it ever gets down as far as my position and I leap into the breach like a hero, I'm off the beam and the stuff is on the roger."

"I'll give you a Solar Citation for your efforts," offered the superior ruminatively. "I know what you mean. We've been trying to keep it from happening by mere chance. And all of a sudden comes official orders, not happenstance, but ordering it. Let's both give up."

"The gear is on the air again," said Manley. "I'll carry on, like Pagliacci, roaring madly to our own doom. But first I'm going to have to restring the master. Shoot me a confirm, will you? I don't expect to use it, but it'll look nice in some time capsule as the forerunner of history."

Within a minute messages forty-eight and forty-nine were through the machine, up through the master modulator room and out in space, on their way to Mars and Venus, respectively.

The Little Man looked up at Coordinator Kennebec. The head of the Solar Combine looked down with a worried frown. This had been going on for some time. The Little Man had been, in turn, pleading, elated, demanding, mollified, excited, and unhappy because the ruler of the Solar Combine could not understand him fully. He was also unhappy because he could not understand the head man's meaning, either.

The Little Man had three cards in his hand. He was objecting violently, now. He was not angry, just positive of his desire. He put two of the cards on the desk before Kennebec, and agreed, most thoroughly, that these were what he wanted. The third card he tossed derisively, indicating negation. This one was of no use.

Kennebec shrugged. He picked them up and inserted the unwanted card between the other two. He did

it with significance, and indicated that there was a reason.

The Little Man shrugged and with significance to his actions, accepted the three. If he could not have the two without the third, he'd take all three.

He saluted in the manner that Kennebec understood to be a characteristic of the Little People's culture. Then he turned and left the office, taking with him the three cards.

As he opened the door, he was almost trampled by Kennebec's daughter, who was entering on a dead run with a bundle of transmitter tape trailing from one hand. Patricia looked down, made a motion of apology to the Little Man, whose head came just even with her hip, and then turned to her father as the Little Man left the scene.

"Dad," she said, "here are press flashes from Mars and Venus. Singly, either one of them pleases me greatly. Simultaneously I can't take it."

"Sorry, Pat. But this isn't a personal proposition."

"But it means trouble."

"Perhaps."

Patricia snorted. "It does mean trouble and you know it. How are you going to avoid it?"

"I'm going to assign Flight Commander Thompson to the task of keeping or combing them out of one another's hair."

"And if and when he's successful," smiled Pat derisively. "I assume that Thompson will be awarded the Solar Citation for bravery and accomplishment far above and beyond the call of flesh?"

"He'll have earned it," smiled Kennebec. "Let's see what the sister worlds have to say."

"Not much—yet. Neither one of them seems to be aware of the other's action—yet. I'll bet the Transplanet Press Association wires will be burning when they all find out."

"TPA is going to suppress any word of dissension," said Kennebec.

"Um-m-m—seems that Terra, as usual, has a bear by the tail. Why couldn't he have picked less dangerously?"

"Knowing nothing of the Little People's culture, I can't say. I don't even understand him most of the time excepting that I have attained the idea that something is very important and must be done immediately. What it is I don't really know, but I gather that it concerns the integrity of a number of stellar races including that of the Little People."

"Sounds like corny dialogue from a bum soap opera," said Patricia. "It's a sorry day for civilization when it must depend upon a deal like this."

"I'm certain that they understand. The Little Man reviewed the records. Given the apparent understanding of mere records that he has—in spite of not being able to understand me or any other Solarian—he must know that we're all playing fireman in a powderhouse. He is going on through with it in spite of what he must certainly know."

"I feel inclined to take a vaca-

tion at Lake Stanley or Hawaii until this blows over."

Kennebec laughed. "It won't be that bad, and besides, you're a part of this and no matter where you go, you'll be in it. Might as well give up, Pat. You can't run now."

"I know," answered Patricia wistfully, "but I'd like to keep out of the way of any flying glass."

Stellor Downing was Martian by birth and by six hundred years of Martian-born forebears. His family could trace its line back to the first group of Terran colonists that braved the rigors of Martian life before technology created a Martian world that was reasonably well adapted for human life.

Downing, being of hard nature, cold and calculating, and murderously swift, should probably have been dark and swarthy with beetling brows and a piercing stare.

But Downing lived on Mars, where in spite of the thin atmosphere, Sol's output was low. Downing had light hair, a skin like the baby-soap ads, and pale-blue eyes that looked as innocent.

A lot of people had been fooled—but not Martians.

Stellor Downing's rapid rise up through the ranks of the Solar Guard was legendary on Mars. His swinging gait was more or less known to all theater-going Martians, and the sound of his voice over the radio was familiar. He wore a double modine belt, with one of the nasty weapons on each hip—where they crossed over his stomach, a dull silver medallion held them together.

The medallion was the sharpshooter's award.

Stellor Downing came on the spaceport escorted by six or seven officials. He talked with them until it was time for take-off. Then they all became more serious.

"We have no idea what this mission is," said one. "But if you do it honor, you'll get that other star."

"That'll make you a Flight Coordinator," added another.

"I can't make any promises," said Downing. "I'll do my best."

"Terra must be really in a hole to call on you," laughed a third. "You're by and far the best flight commander in the Guard."

Downing lifted his eyebrow. "I'll admit that I'm not the worst," he said cheerfully. "I hope you're right about the other." He turned to his orderly and gave a sign. The orderly lifted a whistle and blew a shrill note that cut the thin air of Mars.

Three hundred men entered twenty-five ships, and the spaceport was cleared. Radio messages filled the ether, as the ships were checked before take-off. Then as the clamoring of the radio died, a more powerful transmitter in the flight commander's ship gave the order to lift.

The center ship, bearing the red circle of Mars with the five stars ringing it, lifted first, followed by the next concentric ring of ships.

The third ring followed in close formation and then the last. In a great space cone, the flight closed into tighter formation and streaked

straight upward and out of sight.

Stellor Downing was on his way to Terra.

Flight Commander Clifford Lane was driven onto Venusport in a cream-colored roadster that was either spotless enamel or mirror-finish chromium as far as the eye could reach. In the car with Cliff Lane were four women whose glitter was no less flagrant than the car's. The slight olive-tint to their skin made their very white teeth flash in the sunshine as they smiled at their passenger.

This was Venus—living at its highest temperature. The car rolled to a stop beside Cliff Lane's command and they all climbed out. It was with a generous display of well-browned skin.

Lane's costume was no less scanty than the women's. The modine over his right hip was chased with silver and engraved, the holster was hand-tooled and studded with five small emeralds.

"What are you going for?" asked one of the women.

"Don't you know?" teased the one beside her. "Cliff is going to Terra to court Patricia Kennebec."

"I think we should kidnap him."

"You'd be sorry," laughed Cliff, waving the official order in front of her.

"Maybe we can bribe him. Tell you what, Cliff, you get this job done and you'll probably get a promotion. If you do, we'll all chip in and get that insignia on your modine holster changed to six full stars. But to do it you'll have to come back to us—single."

Cliff laughed. "And if it takes me more than six months, you'll all be off elsewhere."

"But what's Patricia got that we haven't?" wailed one.

"Him," grinned another.

"No, we've got him—now."

"Any time someone wants something else, you might as well give it to them, because they'll get it one way or another."

"Look, kids," interrupted Lane, "we've been talking this up and down for three hours. Now it's time to take off. Scram, like good little lovelies."

Cliff bade them a proper good-by and herded them back into the car. It started and rolled slowly away amid feminine calls. Its course was erratic, for the driver was handling the car by instinct; her head being turned back over the front seat to watch Lane, too. Had she been on a road instead of a broad, shining expanse of tarmacadam, trouble would have met her more than halfway.

Cliff waved a last good-by and turned to face a group of kine-photographers. "Hi, Hal. Hello, fellers."

"Hey, Cliff, will you wipe your puss or don't you care if Venus sees their Favorite Son in lipstick?"

Lane laughed and wiped. "On me it doesn't look good," he agreed. "What'll you have?"

"We'd like shots of you giving the last order, entering the ship, and then wait until we can get set up on the edge of the field.

We want a pan shot of the command hitting the ether."

"O.K. That we can do."

He turned to the group of unit commanders and said. "The usual, fellows. Straight up and away. Hey, Hal, pan the gang, will you? As a hotshot I'm slightly cool if they aren't behind me."

"Great stuff," grinned Hal. The kinephotogs spread out, took their shots, and then closed up for the final order. As the space door clanged shut, they raced for the edge of the field and waited.

With an instantaneous rush, the lead ship, bearing the green triangle of Venus surrounded by the five stars of the flight commander, took off in a slight swirl of airswept dust. Then at a separation of exactly three tenths of a second, the other twenty-four ships leaped into the sky and formed a long spiral in space.

The specks that were lost in the sky were Clifford Lane and his command heading for Terra.

II.

The Little Man had a name. Once in his own tiny spacecraft and surrounded by his cohorts, he was addressed in his own semi-speech, semimental means of communications.

"You have succeeded, Toralen Ki?"

"As best I can."

"Not perfect?" asked Hotang Lu.

"As long as the lack of communications exists, there can be no transfer of real detailed intelligence between the two races. They have no mental power of communication at all, of course, and since we use our mental power when we wish to carry over a plan or abstract thought, we fail when we are confronted as we are now. There are no words in our audible tongue that have the proper semantic meaning."

"But you did succeed in part?"

"I have succeeded so far as gaining their co-operation. They will assign to me or to us, rather, the necessary personnel and material to complete the task."

"Then we have succeeded."

"In a sense. To carry this concept over was most difficult. As long as we have their consent, everything will work out in time."

"You have succeeded in convincing them that the Opposites must be used?"

Toralen Ki smiled. "The Opposites we picked are violent enemies."

"Good!"

"It could be better. I'd hoped that they would be mere opposing personalities. It is not necessary that people of opposite personality be bitter rivals for everything."

"But the greater the opposing forces, the greater the strength of the mental field."

"In this case," said Toralen Ki thoughtfully, "they insist upon including a third party, of equal rank, to act as referee, or mediator. It will be his task to keep the Opposites from fighting one another."

"They were quite concerned?"

"Definitely. It was most difficult to convey to them the fact that the future of their—and all,

for that matter—race depends upon absolute co-operation between the mental opposites we have picked."

"Once the suppressor is destroyed, communication with this race will be easy. Then they can be told."

Toralen Ki shook his head. "Fate is like that. To carry out the plan properly, they must co-operate. In order to tell them what they must do, the suppressor must first be destroyed. And were it not for the suppressor in the first place, the mental capability of this race would require no assistance from the like of you and I or any other member of any other race. The Loardvogh were very brilliant, Hotang Lu. To hurl suppressors of mental energy through the Galaxy was a stroke of genius."

Hotang Lu smiled sourly. "I suppose it is a strange trick of fate to have the fate of the entire Galaxy hanging upon an act of co-operation between two bitter rivals. Especially when the means to explain fully also hangs upon the outcome of their co-operation. I am reminded of an incident in my boyhood. I sought work. I had no experience. They wanted men with experience. In order to get the experience I must work—but they wouldn't put me to work without experience. But it will be easier once the initial step is taken," said Hotang Lu.

"I know it will. It will be so much easier once they understand our motives, at least. Had they proved non-co-operative, we would have been completely stopped. As it is now, we can foresee the proper culmination of all of our plans. We will win, yet!"

"To our ultimate victory," said Hotang Lu, taking a sip from the tall tube before him. Toralen Ki followed the other, echoing the words.

"It is fortunate that they have evolved as far as they have," said Toralen Ki, after the toast. "Dealing with a completely ignorant race is more difficult. These people have a proper evaluation of technical ideas. Therefore they will understand the proper course without having it forced down their collective throats."

"With their already available knowledge of the super drive, it indicates their ability. Have they colonized any of the nearer stellar systems yet?"

"Several. But the urge is not quite universal, yet. Only the adventurers and the malcontents seem to go. They will spread though, if they're not stopped within a reasonable time."

"Time . . . Time—" muttered Hotang Lu. "Always time. Must we fight time forever?"

"Fighting time is most difficult when you are behind," remarked Toralen Ki. "When you are ahead, it is no longer a fight."

"We must move swiftly and yet we can do nothing to cause haste. Confound it, must a man always be pinched between the urgency and the impossible?"

"Certainly. It makes one feel the

ease of life during the times of no-stress."

"Some day I hope to see a period of no-stress that is longer than one tenth the duration of the trouble before and after it."

"You may," smiled Toralen Ki. "But there will be no after."

"Gloomy thought. I'll forget it, thank you. But to change the gloomy subject, I suggest that we contact Tlembo and let our ruler know that we have, in part, been successful."

"Right. I wish we were artists. So much can be conveyed to others by mere pictures."

Hotang Lu shook his head. "How could you possibly sketch the operation of a suppressor? Perhaps *they* could do it, for they seem to have advanced the art of thought-conveyance through pictures to a high degree. But recall that no Tlemban ever considered the art a necessary one and so we lack the technique."

"I know."

"After we contact Tlembo, when can we say we are to start?"

"I think they convey something about two days. We await the arrival of the contingents from the other planets."

"More time wasted."

"Think of the eons before this and the eons that will follow. And then think of how utterly minute your two days are. They will arrive, but quickly enough."

Flight Commander Cliff Lane heard the recognition gear tick off, and he whirled to look at the scanning plate. "The devil," he growled.

"Sir?"

"What is he doing here?"

"I don't understand, sir."

Cliff smiled wryly. "Sorry. I thought this would be more or less pleasant."

"Isn't it?"

"That trace," he said, pointing to the squiggle on the scanning plate, "happens to be the recognition trace of no one other than Stellor Downing."

"Oh," said the orderly. "I didn't know."

Lane grinned. "Then you're the only one that doesn't. Any of the rest of this outfit know it on sight. Take a good look at it, Timmy, and the next time you see it, do your best to do whatever that is doing, but do it quicker, neater, and with more flourish. Understand?"

"Yes, sir."

Lane strode into the operations room, and looked over the plotter's shoulder. "What's he doing, Link?"

Lincoln made some calculations on a paper, plunked the keys on his computer for a moment and then came up with an equation. He showed it to Lane with a grimace.

"Landing," said Lane cryptically.

Lincoln nodded.

"Can we beat him in?"

"I think so—if we get the jump on him."

"There are just two landing circles on Mojave that aren't dusty," said Lane. "One of them is not far from the field office building. The other takes a full hour of travel before you can check in. I don't like to walk."

"Right. I'll see what we can do."

"Good."

One-tenth of a light-second away, an aide entered Stellor Downing's cabin. "Recognition, sir," he said. "Flight Commander Lane, from Venus. I thought you'd like to know."

"What's his course?" clipped Downing.

"Mojave."

"Tell the tech to drop interferers. Tell navigator to correct course for blitz-landing, and tell pilot to streak for landing Circle One. Also broadcast crash-warning."

"Right. We're going in if we have to collide to do it, sir?"

"We'll have no collision. Lane wouldn't care to scrape any of his nicely painted little toys."

"On the roger," said the aide, leaving immediately.

Two flights of ships changed course.

Down on Mojave, in the control and operations tower, signal officer Clancey's face popped with beads of cold sweat. He sat down heavily in a chair and:

"Tony! Get me the chief!"

"What's wrong, sir?" asked Tony.

"This desert ain't a big enough landing field to take on Lane and Downing. Not all at once."

"Lane and Downing!" Tony streaked for the telephone. He called, and handed the phone to Clancey, who plugged it into his switchboard, putting it on his own headset so that he could hear both the chief and the operations.

"Chief. Look, this is too hot to handle. Lane and Downing are both heading for Mojave."

"I know."

"Do you?" asked Clancey sarcastically. "They're heading for Mojave. They're racing for Number One. And they're due to arrive within three or four milliseconds of one another!"

"Hell's Rockets! exploded the chief. "Get 'em on the air and tell 'em they're under orders."

"There isn't any air. One of 'em dropped interferers."

"Official?"

"Unofficial."

"O.K. Record the fact and then go out and watch. It's out of your hands if they can't hear you. As long as you have a record of interference it's not your cookie. It belongs to them."

"Mind if I head for a bomb-shelter?" grinned Clancey.

"Oh, they're both smart. That's one fight that never hit an innocent bystander."

"—yet," added Clancey.

"Well—?"

"It might be the first time I died, too," objected Clancey.

"You don't want to live forever, do you?"

"Wouldn't mind."

"Nuts. There must be something good about dying. Everybody does it."

"But only one; never again."

"Well, play it your way. I sort of wish I could be there to watch, too."

"Just tell mother I died game. So long, chief. I hear music in the

air right now, and hell will pop directly."

Like twin, high-velocity jets of water, the two space flights came together, rebounded off of their individual barrier-layers and mingled in a jarring maze of whirling ships. In a shapeless pattern they whirled, and they might have whirled shapelessly all the way to Mojave, except for one item.

From Downing's lead ship there stabbed one of the heavy dymodine beams, its danger area marked with the characteristic heterodyne of light. It thrust a pale green finger into the sky before it, and as it came around, the other ships moved aside. That was the breaker. The flights re-formed into twin interlocked spirals that thrust against one another with pressors and tore at one another with tractors in an effort to break up the other's flight.

Lane snapped: "That's a stinking trick."

"He's warning—"

"Oh, nice of him to heterodyne it. I wish I had a roboship. I'd drive it into his beam and tell him that he clipped my men—"

Stellor Downing grinned at his unit commander. "I told you he'd duck," he said loftily.

"Wouldn't you?"

"Nope. I'd drive into it and see if he'd shut it off before I hit it."

"Supposing he didn't shut it off?"

"Don't ask me," said Downing. "If he did, it would be to spare the men with me. If I ducked at the last minute, it would be for the same reason. If we were alone, I wouldn't dive into a beam—but we might try a bit of rivet-cutting."

The unit commander's face whitened a bit. That was an idea he disliked. And yet some day he knew they'd get to it. Just as practically everybody knew it.

The hard ground of Mojave whirled up at them, and the twin spirals flattened out. Like a whirling nebula, they spun, slowing as they dropped.

Clancey groaned from the top of the tower: "There ain't room for fifty ships in Circle One. There ain't room for six ships fighting one another. Holy—"

The spattering of force-beams, tractor and pressor, died as the last hundred feet of altitude closed in. The ships, still wabbling slightly, slowed their spinning around and curved to drop vertically for fifty feet.

The ground shook—

And there was left but one dustless landing circle at Mojave—the other one.

Windows in the control tower cracked, a fuse alarm rang furiously, and somewhere a taut cable snapped, shutting off the fuse alarm for lack of juice. The lights went out all over the Administration Building, and every ceiling dropped a fine shower of plaster freckles.

They landed on empty desks and open chairs.

Seven thousand employees of Mojave were crammed out on the view-area, wiping the dust from their eyes and shaking their heads.

And through the dust, weaving their way between the ships of

either command. Cliff Lane and Stellor Downing advanced upon one another.

Out of a cloud of dust came Lane. Downing emerged from the other side and faced the Venusite.

"You fouled me," snarled Downing.

"Who, me?" asked Lane saucily.

"I broadcast a crash-warning."

"You should have done it before you dropped interferers. All I know is that you disputed my course."

"So I did. So what?"

Lane reached for a cigarette. He did it with his left hand, though he knew that Downing wouldn't draw his modines while either hand was occupied. Downing was fair, anyway. "So you didn't get what you wanted—again."

"Neither did you."

"All right. Are you happy? Got to have the best, don't you?" growled Lane. "Can't stand to see anybody take even a toothpick that you can't have two of."

"If you were more than a drugstore cowboy . . . brother, what a get-up."

Lane flushed. "My clothing is my own business."

"It's very fetching. Chic, even."

"Shut up, dough-head. *I'm* not forced to wear an iceman's uniform so people won't think—"

"What's the matter with me?" gritted Downing.

"You might at least put on a clean shirt," drawled Lane, tossing his cigarette at Downing.

"Oh, swish—"

That did it. Lane's right hand streaked for his hip after a warning gesture. Downing's two hands dropped and came up with the twin modines.

Only a microtime film record would ever tell the quicker man. Their weapons came up and forward and the dust of landing Circle One was shocked with a sharp electrical splat.

III.

"And that's your job, Thompson," said Kennebec.

"And that's enough," responded Thompson. He wiped his face.

"Oh, I'll issue the proper orders. They'll receive them—and any trace of insubordination on the part of either of them will be cause for reprimand. Public reprimand."

"But the reason behind all this? I don't understand."

"Nor does anyone else. Look Thompson, the Little Man has a super ship out there on Mojave. It is a real bear-cat. Packed into space smaller than this office is enough stuff to hold off the Guard for a week. That's premise number one.

"Number two. They have some sort of telepathic means of communications.

"Number three. They came here for help. Why, I may never tell you until it's analyzed by the experts. But they came here for help. A machine, bomb, some means of hell and destruction or other must be destroyed. It must be located, too. Using some means of analysis on our card files, voice

records, identification quizzes, and so forth, they decided upon Lane and Downing as the mainsprings. They'll have none other. Now why or wherefore isn't for me to decide. If they want Lane and Downing, they'll get Lane and Downing and none others. At the very least, we've got to play their game as long and as well as we can play it. I want to have the Solar Guard equipped as well as that ship is, and this is the way to do it."

"Why don't they go out and destroy this thing themselves?" asked Thompson.

"I wouldn't know. You know as much as I do."

"They may fear the cat race."

"If I had their stuff, I'd fear nothing."

The telephone rang and Kennebec lifted it. He listened and then hung up slowly.

"Your job—" he said. "Lane and Downing are making a running fist fight to see who lands on Circle One. If you go a-screeching fast, you might be able to make it by the time they hit."

"Right—" and Thompson left unceremoniously.

He hit the street, landed in his car, and was a half block away, siren screaming, before he realized that he had a passenger. It was Patricia.

"Huh?" he asked foolishly.

"Well, the engine was running, wasn't it?"

"I didn't notice."

"Fine thing."

"You must have heard."

"Who hasn't. Come on, Billy. A little more soup. I know that pair and they won't waste time."

Thompson poured more power into the car and it increased in speed. The way was cleared for him, though it took some expert driving to cut around and through the traffic, stopped by the demanding throat of the official siren.

Thompson roared up the main road to Mojave, sent the guard-rail gates flying dangerously over the heads of onlookers, and sped out onto the tarmacadam. The dust of the rough landing was just starting to rise as Thompson slid into the outskirts of the circle of ships. His car skidded dangerously on locked wheels, and he used the deceleration of the vehicle to catapult himself forward. He landed running and disappeared into the circling dust.

He could be certain that Lane and Downing would be at the center of this whirling mass.

Lane blinked. Downing shook his head in disbelief. Both recharged their modines and—

'That's about enough!" snapped Thompson, coming through the dust. "You pair of idiots."

They whirled.

"No, you didn't miss, either of you." He waved his own modine. The aperture was wide open. "But I've got a job to do and you aren't going to spoil it on the first try. I'd hate to rpeort to Co-ordinator Kennebec that I'd failed—doubly. And that all there were to his plans were two hardly scarred corpses."

He tossed his weapon on the

ground and nursed his hand.

"You're the fool," said Downing. "Don't you know you can't absorb the output of three on one of 'em?"

"I did," snapped Thompson. "Though I'd rather use a baseball bat on both of you."

"We didn't intend to hurt anybody," explained Lane.

"Good. Now that that's over, you might play sweet for a while, doing penance for burning my hand."

"You mean we're going to work together?" asked Lane in disbelief.

"And you're going to act as though you liked it."

"I won't like it," scowled Downing.

"Just make it look good. You've got a job to do, and once it is done you can go rivet-cutting for all I care."

"It's an idea."

"All right. But listen, you pair of fools, Patricia is coming through this haze you kicked up. Take it easy."

"Pat!" it was a duet.

"Yeah, though you should both call her Miss Kennebec after this performance."

"You leave her out of this," snapped Lane.

"After one more statement. You fellows can fight all you want to, but remember, if you're fighting for Pat, just consider how she'd feel to A, if as and when A chilled B to get rid of B's competition. Now let's behave ourselves—and if you're asked, this was a fine shindy; a real interesting whingding."

Clancey saw the four of them emerge from the aura of dust and he held his head. "Look at 'em, chief. It ain't goin' to last. I know it ain't. Mis's Kennebec holding an arm of each of them and Mr. Thompson chatting to all three from behind."

"Clancey, this may be the calm before the storm. But from what I hear, both of them will be a long way from Sol when the tornado winds up. They're heading for the Big Man's office right now. He'll tell 'em."

"I think I get it," said Lane. "He wants us to analyze it. That's why this motion of our heads to the thing."

"You may be right."

"This is a long way from here, though. I don't quite get it."

Kennebec explained his reasons for playing the Little Man's game.

"O.K., chief. I've heard of this cat race," said Downing.

"You have?"

"Only malcontent rumors. Tramps, adventurers, and the like are inclined to take runs like that for the sheer loneliness of it—and the desire to set foot where no man ever stood before. It's about the limit of run with even a Guard ship. I suppose any rumors can be discounted, but I've been given to understand that they are a rather nasty kind of personality."

"Being cats they would be," added Lane.

"Not necessarily," objected Thompson. "We are basic primate-

culture, but we don't behave like apes."

"No?" asked Kennebec with a sly smile.

"O.K."

"Now," said Kennebec. "They've chosen you two for the job in spite of our explanations that you are slightly inclined toward dangerous rivalry. Why they insist I do not know. Be that as it may, gentlemen, you have this project. You have twenty-five ships each, all armed to the best of Solar technique. You'll have to play it close to your vest, I gather, since this machine or bomb is at present running through their system. Therefore I order you, officially, to refrain from any competitive action until this project is completed. The

Little Man has detectors to locate the thing, you'll each get one of them. Track it down and analyze it. Destroy it after you could reproduce it. Thompson, your only job is to remind this pair of worthies that their prime job is to finish this project."

"It may be not too hard," smiled Thompson. "I won't have any trouble."

"Look, Downing, if this thing is as important as they claim, we're fools not to work together. Right?"

"As corny as it sounds—the fate of races depends— I believe the Little Man. Until this fool project is over, no fight."

"Shake."

Downing made a "wait" gesture. He picked up an ornate dinner candle from the mantelpiece and lit it. He took cigarettes, offered one to Lane, and they shook hands. And they lit their cigarettes in the same candle flame.

And Thompson said to Kennebec: "A pair of showmen."

"And the best flight commanders in the Guard, confound it!"

Stellor Downing, out of his Martian uniform and wearing the dress uniform of Terra, piloted Patricia Kennebeck through the tables to a seat. "Stop worrying," he laughed.

"I suppose I should," she admitted.

"Then please do."

"I will. It isn't complimentary to you, is it?"

"I wouldn't worry about that."

"All right. But I still think I'm fostering trouble for both of you."

"By coming out with me tonight? Lane asked—but he was late. He can't object to my making plans first, can he?"

"He admitted that he had only himself to blame."

"Then?"

"But I can't help thinking that I'm the cause—"

"Look, Pat. Analyze us. Cliff is Venusite. His family went to Venus about six hundred years ago —probably on the same ship that mine left for Mars on at about the same time. Lane's impetuous and slightly wildman. I'm more inclined to calculate. Dance?"

"Yes—that was a quick change of subject, Stell. How do you do it?"

"The music just started—and my basic idea in coming here was to dance with you."

"How about ordering? They'll get the stuff while we're dancing."

"Everything's ordered," he smiled. He drew back her chair, offered her an arm, and led her to the dance floor.

Downing's dancing was excellent. He was precise, deft, and graceful despite his size. The orchestra finished the piece, and then with a drum-roll introduction led into the classic *"Mars Waltz."*

The step was long and slow and though some of the other couples drifted off the floor to await something more springy, they finished the long number with a slight flourish.

Another drum-roll, and: "Ladies and Gentlemen," said the announcer, "that number was in honor of

Stellor Downing, number one Flight Commander of the Martian sector of the Solar Guard!"

There was a craning of necks to see the Martian, and Downing politely saluted before he retreated to his table.

"And in this corner . . . pardon me, I mean over here, ladies and gentlemen, we have Clifford Lane, the top Flight Commander of the Venus sector!"

The necks swiveled like the spectators at a tennis match and the spotlight caught Cliff, standing at the door with a woman on each arm.

At a word from the manager, four large, square-shouldered men in tuxedos accepted two tables. Base lines for defense—

But Lane merely nodded affably in the bright spotlight. "Thanks, and now, professor, that light is bright. Play, George. The Caramanne if you please."

"But I can't dance the Caramanne," objected the girl on his right.

"And I wouldn't dance it in public," said the girl on his left.

"Well, we all know someone who can and will," laughed Cliff. He led them to Downing's table, shook hands with Stellor and underwent a ten-second grip-trying match. He introduced them all around and then asked: "Downing, may I steal her for a moment? I think she's the only one present that can hang on while I take care of the Caramanne."

"For a moment," said Downing.

The four men in tuxedos blinked and shook their heads. The manager took a quick, very short drink. It was a draft of sheer relief.

The pulse-beating rhythm of the native dance of Venus started with rapid tomtom, and then carried up into the other instruments. With the floor to themselves, Cliff and Patricia covered most of it in the whirling, quick-step.

"A fine specimen of fidelity you'd make," she laughed.

"Well, you were busy. I had to do something."

"You seem to do all right. They're both rather special."

"Know them?"

"Only by nodding acquaintance."

"Well, any time you have time to spare for Cliff Lane, just let me know and I'll toss 'em overboard and come running."

"And in the meantime?"

"And in the meantime, I'm not going to rot."

The dance swung into the finish, which left them both breathing hard. Lane escorted Patricia back to the table, where Downing sat silent. As they came up, a third man approached. Lane seated Patricia and then greeted the newcomer.

"Hi, Billy. Lucky, we've got a girl for you, too."

Thompson breathed out. "Oh," he said surveying the situation. Both situations looked him over and smiled. "Lenore, and Karen, this is Billy Thompson. He's in division."

"Which division?" asked Lenore.

"Subdivision," grinned Thompson. "I'm the guy they got to comb these guys out of each other's hair."

"Poor man," sympathized Karen.

"You gals match for him," laughed Cliff. He tossed a coin.

"Heads!" called Lenore.

"You lose—take him," chuckled Lane.

Lenore put her arm through Thompson's. "Nope," she said brightly, "I win."

The spotlight hit the table. "We might as well finish this," laughed the announcer. "I present the referee . . . pardon me, folks, I mean the top man of the Terran sector; Flight Commander Billy Thompson!"

The music started, and all three couples went to dance to a medley of Strauss' waltzes.

IV.

"It was all sort of whirligig, like," explained Patricia. "We didn't get home until along toward the not-so-wee large hours of the morning."

"I know," responded her father dryly. "The whole gang of you were raiding the icebox at five."

"The rest of them left shortly afterward."

"All of them?"

"No, Stellor outsat them and lingered to say goodnight."

"What do you think of Stellor?"

"I've always thought highly of Stellor. He's got everything. He knows what he wants and he knows how to get it."

"And Cliff Lane?"

"Cliff is strictly on the impulse."

"I wouldn't say that," objected her father. "After all, both of them got where they are because of their ability."

"Well, Cliff gives the impression that he just thought of it."

"Of what?"

"Of whatever he was going to do next."

"A good thing nobody ever asked you to decide between them."

"It would be difficult."

"Well, it won't be necessary. They're leaving after the next change of watch."

"So soon?"

"The Little Man gave the impression that all of us were fighting for time."

"I see. You do believe that this is important?"

"I can see no other reason for it."

"Um-m-m. Well, I'll be down to see them off."

"All of us will."

"I was worried, last night. I could see a beautiful shindy in the offing."

"And it didn't get bad at all?"

"No," answered Patricia in surprise. "I think Cliff saved the day by showing up with a couple of women. I wouldn't have wanted to sit between the two of them all by myself. That would have been strictly murder. And I wouldn't have wanted to see Stellor off without saying farewell to Cliff. Stellor got here first with the plans—I was strictly a fence. I didn't know what to do. So I did it. And everything turned out fine."

"You can hope that it will always turn out fine. What'll you do if one of them turns to some other woman?"

Patricia laughed wryly. "I'd lose both of them, Dad. Believe me, I would. The other would barge in and set sail for the woman just as sure as I'm a foot high."

"But . . . but . . . but—"

"I don't really know—nor do I care too much."

"Anticipating me? You mean you don't know which one really wants you and which other is just here for sheer rivalry?"

Patricia nodded. "They don't, either," she said sagely. "It is a good thing that we have time. Time will out, as you've always said. Time will get us the answer. Right now I'm neither worried about time, or even not having my mind made up on a future. I've got a number of years of fun ahead before then."

"Bright girl," laughed Kennebec. "Now let's get going. We want to see them off, don't we?"

Two hours later, seventy-five of the Solar Guard's finest ships arrowed into the sky above Mojave. In the lead, determined by a toss of the coin, was Stellor Downing's command. Thompson's outfit, running to his own taste, encircled the Downing cone at the base in a short cylinder, while bringing up the rear was Cliff Lane's long spiral. An hour out of Mojave, the flight went into superdrive and left the Solar Combine far behind in a matter of minutes.

By the clock, it was weeks later that the Solar Guard's flight dropped down out of superdrive and took a look around. The Little Man, in Thompson's ship, used his own instruments and indicated that the yellow star—it was more than a star at their distance—dead ahead was the one they sought.

"Downing," called Lane. "How's your power reserve?"

"Like yours, probably."

"We'd better find a close-in, hotter-than-the-hinges planet where they won't be populating and charge up, what say?"

"Good idea. Better than the original plan of charging in flight. If it's close in, it'll have ceased revolution, probably. We can hit the twilight zone and rest our feet a bit."

"O. K. I'll put the searchers on it."

"We'd better take it by relays, though. A fleet that's planeted for charging isn't in the most admirable position for attack."

"Reasonable. You charge, Thompson'll guard, and I'll scout around."

"You'll do nothing of the sort," growled Downing. "You and Thompson will both guard."

"Afraid?"

"No, you idiot. I'm jealous as hell. I don't want you to take all the glory."

"And that's probably the truth," laughed Lane.

"Take it or leave it."

Thompson interrupted. "This sounds like the leading edge of a fight. Stop it. We'll play it safe—Downing's way."

"O. K.," assented Lane cheerfully enough.

"Thing that bothers me," muttered Downing, "is the fact that if

this bunch have any stuff, we're being recorded on the tapes right now."

"So?"

"And if they're as nasty as the Little Man claims, they'll be here with all of their nastiness."

"All right," snapped Lane. "We've got detectors and analyzers, haven't we?"

"Uh-huh. But we're a long way from home base. What we've got we've got to keep—and use. They can toss the book at us and go home for another library. Follow?"

"Yup. Located a planet yet?"

"Haven't you been paying attention?"

"No. You're in the lead. I'm merely following as best I can."

"Then sharp up. We're heading for the innermost planet now."

"Go ahead—we'll go in to see. Then Lane and I will scout the sky above to keep off the incoming bunch, if any," said Thompson.

It was an armed watch. Downing's flight landed and set up the solar collectors. From the ships there came a group of planet-mounted modines which had little to offer over the turrets in the ships save adding to their numbers.

The other two flights dropped off their planet-mounts, too, since they were of no use a-flight and might even become a detriment if trouble demanded swift maneuver.

Then a regular patrol schedule was set up and alternately Lane and Thompson took to the sky to cover the area. The detectors were overhauled and stepped up to the theoretical limit of their efficiency, and couplers and fire-control systems were hooked in and calibrated.

It took nine days by the clock to get the camp set up, and Downing's flight was almost recharged by the end of that time.

As Thompson's flight went in for re-charge, Downing and Lane discussed the camp.

"I say leave it here," said Lane. "Might be handy."

"When?"

"I don't have any real idea. But we've got one hundred and fifty extra dymodines planet-mounted down there. I say leave it there until we get this problem off our chest."

"Expect trouble?" scoffed Downing.

Lane nodded. "I expect this to end in a running fight with one of the two of us making a blind but accurate stab in the dark and getting that machine the Little Man talks about. If the going gets tough, we can hole out here for some time with the solar collectors running the planet mounts."

"Wonder why the cat race hasn't come up," mused Downing. "It isn't sensible to permit any alien to establish a planethead in your system."

"They might not even know."

"Unlikely."

"Look, though," offered Lane, "we came in sunward, almost scorching our tails. The solar centroid of interference might make any flight detection undistinguishable from background noise."

"Yeah? Remember that we came in over the edge of the sun from

somewhere. We were out in space mostly."

"Then you answer it—you asked it!"

The catmen came as Thompson's flight left the camp and Lane's ships dropped into the charging positions. They came in a horde, they came and they swarmed over the two flights that were patrolling.

In a wide circle, the Solarians raced just outside of the camp. The planet mounts covered the sky above, and a veritable arched roof of death-dealing energy covered the twenty-five ships of Lane's flight. The space between the Solar circle and the catman circle was ablaze with energy, and the ether was filled with interference. Even the subether carried its share of crackle, and the orders went on the tone-modulated code instead of voice.

Solid ordnance dropped, and exploded through the crisscrossing of the planet mounts, and the planeted ships ran their charges down instead of up by adding to the fury over their heads. They were sitting ducks and they knew it.

But unlike the sitting duck, these could shoot back. And they took their toll.

Then without apparent reason, the flight of catmen left their whirling circle on a tangent and streaked for space.

Behind them lay nine smoking ships—prey to the Solar Guard.

But they had not gone in vain. There were seven of the Solar Guard that would fly no more—seven ships and a total of one hundred and seventy-five men.

"*Whew.* They haven't any sense at all," snarled Downing.

"Either that or they value their lives rather poorly."

"Must be. I wouldn't know. But usually a vicious mind doesn't value life too highly."

"I wouldn't be too certain of that."

"All right. I won't belabor the point. I don't know. It just seems—"

The next ten days was under rigid rule. Lane's ships charged, and the last day was spent in replenishing the charges lost in the short but torrid fight.

"Now," said Lane, "what's with this hell-machine that the Little Man mentions?"

"The detectors do not detect," objected Downing.

They confronted the Little Man with the nonoperating detector. He shook his tiny head and worried visibly. He puzzled over it, juggled the circuit controls, and then threw up his hands in bafflement. He spoke to Hotang Lu:

"The field must be so great that the detector is paralyzed."

"It is more than likely. Remember, it was working on Tlembo. It was working on . . . on . . . I have not the word for their star. Many many light-years away it is good. Close by—it must be paralyzed."

"Then we must make it less sensitive."

"Do you know how?"

"I did once, long ago. But I

have forgotten my techniques and my ability lags because of lack of practice."

"And I devoted myself to the arts instead of technology. A revered master at the problem of mental culture; I cannot invade this gadget with tools."

Hotang Lu smiled. "You might try psychoanalyzing it."

"Yes, if it contained but one memory-pattern," laughed Toralen Ki.

"They'd have done better to have sent a plumber and an electrician than we two failures."

"At this point, we must attempt to convey the idea of a search for the master machine."

"It will not be hard. This race will search rather than return home with an incomplete mission. The rivalry that exists between the leaders insures the success of our plan despite any set-back."

Toralen Ki and Hotang Lu faced Lane and Downing. All four shook their heads in complete misunderstanding. Then Hotang Lu sketched a crude diagram of the catmen's star-system. He indicated the master machine and also indicated their search for it and its ultimate destruction.

Lane gritted his teeth. "How big?" he asked aloud, and pointed from the machine to several bits of equipment in the ship.

Toralen Ki said: "Don't know."

Hotang Lu nodded in agreement and tried to convey their ignorance of the size.

"I gather that they've never seen it"

"Chances are if they'd seen it they'd have bopped it themselves," observed Downing.

"Reasonable attitude."

"Well, we have about ten to the twenty-seventh power square miles of blank and utter nothing to curry-comb for a dingus of some sort."

"Blank and utter nothing—hell! I wouldn't mind blank and utter nothing. We could comb it if it weren't for sun, planets, asteroids, meteors, noise-impulses from nowhere-in-particular, just plain hell, and a crew of wild-personalized catmen." Lane paused to take a deep breath. "As it is, the latter is the most complicated of the bunch mentioned. We can't spread out in a space-lattice and comb. We've got to do one of two things. Either we enlist the help—or get freedom of search—of or from the catmen or we comb in a large and armed body."

"That's a nice problem. Either way."

"As has been mentioned before—'Take it or leave it!'"

"Mind explaining how you go about getting chummy with a race that took a swing without asking questions first?"

"That's partly our fault. We just invaded."

"We couldn't spend a few months getting chummy first. We needed power—and bad."

"All right," agreed Lane. "But they didn't know that. And it's all right with me because I'm leery of letting anyone know that I'm vulnerable. Especially people I don't know and therefore cannot trust."

"Have we got what it takes to barge in there and settle down? Can we hold them off until we can make it clear that we don't want their stinking planet?"

"Have we?"

"If we do right now, there'll be a lot of us that stay there for good."

"How many of us are expendable?"

"All of us as long as that dingbat is destroyed."

Lane grimaced. "And how important is it?"

Downing gave an "I don't know" wave of his hands. "We might go looking for trouble, Lane."

"Meaning catch us a single shipload of catmen and let 'em go, well filled with cream and a fine explanation?"

"Might even get a rat or two for them."

"Meaning?"

Downing grinned maliciously. "Guilty conscience?" he taunted. "Forget it, hothead."

"Don't make cracks, Iceberg. O. K., forget it. It's probably the best idea yet. How do we bait a cat trap?"

"Cream—or catnip."

"Very funny," interrupted Thompson. "Exceedingly amusing. You make me laugh, *haha*," he added in a flat, disgusted tone.

"Shut up," chorused Lane and Downing.

"All right. Then stop making light of this. Bait a cat trap. You'll just have to pirate the planet lanes and catch you one."

"The trouble with you, Thompson, is that you have no sense of humor."

Thompson subsided. He realized that this light banter was a cover-up for a deeper feeling. Deprive them of niggling at one another in a light way and they might take to it in a more serious vein.

"It is agreed, then, that we grab us a boatload of catmen and indoctrinate them with Solarian good will and propaganda."

"It is," said Downing. "Time's a-wasting. Let's grab."

V.

Like a contracting funnel, the Solar Guard closed down on the catman ship. They crowded the catman spacer, forced him into a pocket, and then started to drive him their way.

But unlike a pocketed ship, the catman slashed back. An invisible beam came from somewhere on the craft. It slashed out, closed down upon a midsection of the nearest Solar Guard, and ripped the belly out of the ship. It was both brutal and sickening. One moment the Solarian craft was forcing the catman ship to give space or collide. The next moment the midsection had been gouged away; ripped out as with a vicious claw or a set of cruel, gigantic teeth. The crushed midsection was flung free of the stricken craft and as the ship collapsed over its open belly, and died, the catman slashed at another and another of the Solarians.

"Superdrive!" exploded Lane.

The slashing catman got one more

ship before the Solar Guard went into the superdrive and raced away.

"Did you record that?" asked Lane.

"Tried to. The recorder blew."

"So did all of them. "Creepers! What a nasty thing to have around."

Thompson said: "One of my techs is repairing a recorder now. He thinks he can give the wave analysis."

"How?"

"He finds that certain of the crystalline structures in the wave recorder are de-crystallized."

"Meaning what?" demanded Lane.

"Meaning that certain frequencies hit the nuclear resonance of the crystalline structures. I'll let you know."

"Let us know quick," said Downing. "If we can analyze it, we can either reproduce it or shield against it."

"Cats at seven o'clock, forty degrees!" exploded the observer in Lane's ship.

"Anywhere else?" demanded Lane.

No answer.

"Fight 'em," snapped Lane.

There were six catmen converging on Lane's command. The rest of the Solar crew flung around and headed for the local fight. Lane's dymodines flashed out and were stopped cold by barriers.

"Crash stations!" ordered Lane. "Prepare for total destruction!"

The six catmen got above Lane's ship and drove him downward with pressors and an occasional light—it must have been very light—touch of the belly-tearing beam. Above the six were the sixty-odd Solarians fighting to get through and fighting a useless battle.

"We can't damage 'em," snarled Lane. "Superdrive—right through 'em!"

He almost made it. His ship rammed up under the stellar drive, came level with the screen of catmen, and almost made it through. But four of them reached forth with the belly-tearing beams and took separate parts of his ship. The warning creak of plates caused the pilot to stop.

Lane's ship was thrust down below again.

"Superdrive—away!"

Lane's ship turned and dropped.

The action was too fast for the Solarian crew, and he left them far behind. But the catmen were right with him all the way.

"Cut it," said Lane in a tired voice. "Let 'em play. Save our strength for later when we can do something."

They went inert. No drive, no sign of fight, no objection.

A side-force hit them, slapping the ship sidewise about fifty feet. It jarred the ship's delicate mechanisms into a short fluster of unreal alarms and ringing signals, but the sturdy stuff was not permanently damaged.

Still no response from Cliff's ship.

They poked him down brutally with a pressor and then jerked him back up again.

More alarms and more nosebleed among the crew.

They caught the ship in force-zones and played catch with it from one catman to the other, poking and thrusting. They ripped off one of the turrets with the snatcher.

Then they stopped. And they waited. Quietly they hung above Lane's ship, watching, watching, watching.

A full, solid, nerve-breaking hour they waited, and the men in Lane's ship waited, wondering.

"Try it!" snapped Lane.

The ship leaped into motion, driving to one side.

Snatchers raced out and caught the fleeing ship, dragged it back, and again they went through the pushing, pulling, tossing program. And then again they stopped with a few, final perfunctory pokes and shoves.

"They're catmen, all right," snarled Lane.

The rest of the Solar Guard came up, and once more they tried to break through the screen to free Lane's ship. Lane shook his head. "Pilot. How long under super-drive before we hit the speed of light?"

"Seven minutes."

"Then drive straight down. I don't think any beam can exceed the speed of light. Once we get up there, they can't reach forward after us, at least."

Lane's ship dropped. And the catmen followed, maintaining their distance with superior balance and accuracy. A minute passed. Two. Three. Four. Five. And then at an even six, a snatcher reached forward and took Lane's ship by the empennage and shook it enough to rend a few seams.

"O. K., cut it," he said wearily. "I wonder what they want of us beside to play cat-and-mouse?"

There were three more sessions of the cat-and-mouse trick, separated by hour intervals. Then the six catmen, their nature satisfied, took hold of Lane's ship in a cluster of snatcher beams. Lane heard the plates give as the fields-of-focus closed down.

He closed his eyes, breathed a short prayer, and waited.

Stellor Downing called Thompson. "Back to One," he said.

"Giving up?"

"Can you think of anything to do?"

"No."

"Well, let's get back where we can plan."

Thompson assented. It was reluctant, however, and a day later, when they landed on One at their camp, he faced Downing. "Sort of solves your problem, doesn't it?"

"Look," snapped Stellor Downing. "I've got a few feelings and a number of nerves. Lane and I were not deeply in love with one another. Yes, it solves a lot of problems, Thompson, but don't taunt me about it, or I'll take a modine to your throat, see?"

"We might have tried again," insisted Thompson.

"We might have tried for a month. We couldn't even touch them. If you're intimating that I gave up quick—?"

"You weren't leaning over backwards."

"Quoting an old, famous fable, 'sometimes it is better to fall flat on your face.'"

"Meaning?"

"We've got whole skins. They were after captives, not meat. They wanted the same thing we do but they got 'em first."

"So?"

"So we take whatever wave analysis we have and try to figure 'em out. If we can reproduce any of that stuff, we'll go back."

"Hm-m-m."

"Look, Thompson, as far as this job is concerned, your job of keeping Lane and myself out of one another's hair is over. One head of hair is gone, see."

"And what do you intend to do about it?"

"I intend to carry on. Now forget about the fact that a personal grudge of mine has been taken out of my hands and let's get on to working out some means of fighting back. Lane is gone. I'm trying not to gloat. But you're not helping. So stop it."

Toralen Ki shook his head in a worried manner. "One is gone."

"A substitute?"

"I fear that any substitute may not be as good."

"Nonsense, Toralen. Were there a better man than either, we'd have selected him; if either had not existed, a lesser man would have sufficed."

"The right kind is so very few," complained Toralen Ki.

"We can find one. We will have to return to their planet to do so, and it will be harder for us—but it can be done. No good general has only one plan of battle."

"But so much depends— Ah well, despair is the product of the inferior intellect. We will, we must carry on."

Hotang Lu opened his large case. "I will contact our superiors immediately and ask their advice."

"Yes," nodded Toralen Ki. "Also ask them if they have the answer to the less-sensitive detector, yet."

Hotang turned the communicator on and waited for it to warm up. His hand dropped into the case and came up with another small instrument of extreme complexity.

"Once the suppressor is destroyed," he said with a smile of contemplation, "we can use this on them."

"And that means success!" breathed Toralen Ki. "From that time on, our plans—"

"Wait, the communicator is operating," said Hotang Lu, waving a hand. He reached for the communicator's controls and started to talk swiftly, pressing his head against the plate above the voice-transmitter.

Flight Commander Thompson handed Downing a sheaf of papers. "There's the wave analysis," he said with pride.

Downing looked them over. "You've got the technical crew. Can we reproduce all or any of it?"

"Only by tearing down a couple of modine directors. The boys can

convert the spotting, training, and ranging circuits—they'll use the components—and rebuild the thing to generate barriers. The snatcher is easy. We'll just juggle the main modulating system of a tractor generator. That comes out so simple I feel slightly sick at not having thought of it myself."

"What is its analysis?" asked Downing.

"Couple a force beam with a tractor focus-zone generator. The tractor, you know, operates on the field of focus principle. A rough sphere at the end of the beam—anything in that field is drawn. The snatcher merely applies the field-of-focus idea to the side-thrust of a force beam. You raise the power several times and anchor it with a superdrive tube coupled so that the thrust is balanced against a spatial thrust instead of the ship. That tears the guts out of anything."

"I have an idea that you might be able to cut instead of tear if you include some nuclear-resonant frequencies in the field of focus generator."

"Is it necessary?"

"Might be interesting," said Downing. "They tear. If we land on them with something that quickly, precisely, quietly, and almost painlessly slices a sphere out of one of their ships, they may be impressed."

"You have something there. I'm going to tear into some of the planet-mounted jobs. We are now sixty-three ships. I can make one snatcher out of every dymodine that's planet-mounted out here. Shall I?"

"How long?"

"Ten hours each."

"Six hundred and thirty hours. Twenty-six days and six hours."

"We'll make it in twenty days. By the time the boys get to Number Ten or Twelve they'll be working shortcut and on production-line basis and the piece-time will drop."

"Twenty days is long enough, believe me. We'll toss in my gang and Lane's gang, too. They can go to work on the modine directors and make barriers out of 'em if you claim they'll work."

"They'll work."

"Then let's get going. The Little Guys are tearing their hair as it is."

Thompson nodded.

"But look," said Downing, "don't rip up any dymodines ahead. Convert slowly. If the catmen attack, we'll need all we can muster to fight 'em off."

"Right."

"And as for Cliff Lane—he isn't dead until we prove it, see? So far as I know, he might be getting an education in cat-culture right now."

Thompson looked at Downing for a long time, saying nothing. Then he turned and left, still without comment.

Cliff Lane and his ship were herded down to the ground. His ship was surrounded by the six catmen, their beams pointed at him, waiting. For an hour they waited, using all the patience of the feline. It got on the nerves of the humans, and they wanted to do something.

Their trouble was that they didn't quite know what to do.

Cliff, after the full hour had ticked off, said: "I'm thinking of the cat that got a neuropsychosis over mice because one came out of the hole and kicked him in the face."

"Think it's wise?"

"Never was very fond of cats," admitted Lane glumly. "I find them even more obnoxious when I see them employing intelligence. That makes it worse—"

"But just going out—?"

"D'ye want to sit here for months?"

"Think they would?"

"Probably. At least, long enough to have us tearing out each other's hair."

"But—"

"But nothing. Have we got the planet-analysis yet?"

The aide pawed through the delivery basket on Lane's desk and came up with a sheet of paper. He read: "Pressure sixteen point three. Temperature eight-one, humidity thirty-seven. Air: Oxy twenty-one, nitrogen all the rest—with a trace of course, of CO_2. Pollen count not too bad, bacteria count about normal, but the spore count is zero."

"No spores?"

"Nope."

"Gosh," smiled Lane. "Imagine a world where they can't smother a steak with mushrooms!"

"So what are you going to do?"

"Me? I'm going out there and tell 'em what they're missing. Imagine—no mushrooms!"

"I'm just thinking of what a nice world this would be to do tropical research. I've even seen fungus growing on steel."

"No, you haven't. Bakelite I'll buy, but when the stuff grows on steel it is growing on the dust that has collected. Well, tell the boys in the back room to cover me as I emerge."

Lane undogged the spacelock and the rams pulled it back out of the frame. Riding on the front of the automatic runway, Lane stood in an indolent attitude, the thumb of his right hand hooked over the belt just one-half inch from the butt of his modine. His other hand held a cigarette.

As the runway hit the ground, Lane took a last puff of the cigarette, stepped to the ground and dropped the glowing butt. He crushed it with his heel, and then took five forward steps, looking about himself with open curiosity.

The catman ship directly in front of him opened its spacelock and one of the catmen emerged.

Lane walked forward boldly to inspect this alien creature. He acted as though he were not a prisoner, but a visitor—and it was probably that attitude that saved him from further cat-and-mouse, for the catman seemed unsure of the next move.

The catman was more man than cat, just as the human—in the catman's nomenclature an apeman—the human was more man than ape. He stood erect. His legs were long and excellently muscled. His shoulders were broad and sloping, and his arms were well rounded. The temperature was high—to Lane's liking, being Venusite—and the scanty uniform of the catman

matched the shorts, high-laced boots, shoulder straps and cape of the Solarian. The catman's hands were long and spatulate, and the fingernails were as broad as Cliff's. The retractile claws were gone—deleted in a hundred thousand years of evolution. Gone were the fur and the tail and the slitted eyes, and all of the other basic cat-characteristics. The whiskers were gone also, and the ears were no longer mobile, but on each side of the head just as the human's. They were still pointed on top and resembled, or at least reminded Cliff of a cat's ears modified in human mold.

Catman?

Well, there was something distinctly feline about the creature, humanoid though he seemed. He was lithe, and instead of walking forward, he prowled. There was a quick alertness—not visible, but felt—to the catman's every move.

Yes, this creature was definitely of feline evolution.

And Cliff Lane walked forward boldly. He smiled inwardly, gaining confidence from the fact that he was still alive and unharmed. Prisoner he might be, but he was no humble prisoner. He was proud and haughty, and he was not taking any guff.

He strode forward to hasten the first meeting between Primate and Feline on the common ground of civilization.

VI.

The catman's steps faltered. This alien, that had come from some distant star, was definitely primate in evolution. He knew primates—they had primates on Sscantoo, here—and primates were nasty animals. They were filled with curiosity—mass curiosity—that had been the basis for a platitude on Sscantoo: "Curiosity saved a mansee." When you killed or wounded a primate, the woods would fill up with curious, chattering hordes of his fellow-primates. It made life rather dangerous unless you were prepared to fight your way out.

And this curious fellow was none the less a primate in spite of the fact that his face bore the stamp of civilization and he wore clothing. He was curious—even more curious than one of the Sscantovian apes. He walked forward boldly in spite of the fact that he was a prisoner and must know that fact. The catman wondered how bold the primate would have been if his ship had landed of its own free will—or had landed despite the objections of his six ships.

If he were bold now, a prisoner, he would be downright arrogant as a victorious captor.

Linzete, the catman, stopped. He didn't like primates, and the idea of confronting a primate armed with intelligence as well as the natural instincts of the apeman bothered him.

At Linzete's commandatory motion, Cliff Lane stopped. But not until he'd taken a full step beyond the catman's command just to show him. Twenty paces apart they stood, eying one another.

Cliff smiled.

Linzete's eyes glittered.

Cliff shrugged. This was getting nowhere.

Linzete took a step forward, and Cliff stepped forward two steps.

Linzete seemed pleased. This primate, he thought, is no larger nor does he seem stronger than I. I do not believe that he is as quick.

"A move out of you," thought Lane, *"and I'll clip you!"*

Linzete stooped and picked up a pebble from the ground. He put it on top of another pebble, and then stepped back and to one side by fifty paces. He waved Cliff a waiting motion, and then with a lightning motion Linzete drew his side arm and fired.

The sharp crack of electrical discharge split the air. A dazzling pencil of energy spat forth and the pebble disappeared in a blinding coruscation.

Lane laughed.

Linzete scowled. That sound was very much like the chanting and cachinnation that went on among the primates when they were amused.

Cliff Lane stooped, picked up a pebble and threw it high above Linzete's head. The modine came from Cliff's holster, poised for an instant while it spat energy, and then was thrust back home again. The motion was a flowing swift thing of muscle and timing, and the end-result was the explosion of the pebble in midair.

The flash and the explosive report of tortured air and matter caused Linzete to blink. When his eyes opened again, the primate's weapon was holstered.

Linzete's breath came out in a sharp hiss.

Lane shrugged and remembered the hiss of an annoyed cat.

Sound in the air caused both of them to look up. A small ship was circling the open spot, and it landed not far from Cliff. Clad in spotless white—spotless and seamless white—from toe to fingertip, and an inverted bowl of clear glass or plastic, the catman emerged from his open craft and came forward. On his back was a small tank and valves for air, obviously.

Cliff puzzled for only a moment. The white-clad one lifted a square case from the plane and, coming forward boldly, snapped down a portable set of legs and opened the door in front of Cliff.

From the cabinet he took slides of glass. He took Cliff's hand between his gloved fingers and pressed the human's fingers to the slide. He caught the human's breath on another slide. He made a convulsive motion with his face, and Cliff smiled and coughed on another slide. From the cabinet he took a scalpel and with a deft motion—and before Cliff could act—the doctor took a neat slice out of the small finger of Cliff's left hand. He doused the cut immediately; the substance removed the pain, at any rate.

He took a sample of Cliff's blood, scraped the skin of Cliff's forearm, and clipped off eight or nine of Cliff's crisp black hairs.

Then he closed the cabinet and

sealed it. From the plane he took a large spray, and setting it up aground, the doctor proceeded to stand, turn, and generally bathe in the atomizer output. He sprayed the outside of the cabinet with it, and then proceeded to work the ground and air over, spraying in all directions, including the other catman, Linzete. The doctor finished his proceedings by spraying Cliff Lane's ship on the outside, and turning the spray into the spacelock and liberally drenching the runway and entrance of the Solarian vessel.

Cliff nodded understandingly. He didn't even object to being sprayed himself, for the stuff was aromatic though a bit sticky when it started to dry.

The doctor took off.

"Wonder what he'll find," mused

Cliff. And then a large white craft landed. It was completely inclosed, and the driver's compartment was set off from the rest.

"The paddy-wagon," grinned Cliff. Clad as the doctor had been, four catmen came from the craft bearing sprays. One of them approached Cliff and motioned for him to follow. Cliff nodded, but turned and called back:

"Let 'em sterilize to their heart's content, fellows. After all, we want their co-operation!"

He entered the large ship as the other three catmen entered the spacelock of Lane's ship and went to work.

Within fifteen minutes, Cliff Lane was residing in a sterile, spotlessly white room. The windows were sealed and the door was air-tight. A portable atmosphere-cleaner purred in one corner, freshening the air and cooling it. From a speaker in the wall there came music—of a sort—and through a double window in the wall Lane and the catmen indulged in mutual inspection.

A large block of paper hung on an easel, and a heavy black crayon lay in the tray. Cliff nodded. Heavy black crayon so that his sketchings could be seen from the distance. He smiled, scowled at the music, and then started to sketch.

The Little People had not been able to convey the reasons for their desires to the humans, but human and catmen were not possessed of any form of telepathy to augment their communications. Cliff was a fair cartoonist, and he progressed well.

The catmen began to understand.

The days sped past, marked only by the clock and the chiming of watch-change bells. Dymodines returned from their mountings on the living rock of the innermost planet, they entered the ships of the combined commands, and were converted, one by one. The machine shops in the bellies of the ships hummed and racketed, and the stockroom stores went down. The scrap pile outside on the airless face of One grew as the dymodines were converted; parts of no use were tossed out.

The catmen did not molest them. Not once during the twenty days of labor was there any report, or any sight of the catmen. If the catmen were using scanners on them, the catman scanner used frequencies never tried by humans, for the detectors gave the spectrum a clear ticket.

Yet the strain was there, and the men worked furiously to convert the dymodines to snatchers, because they knew that until they were finished, they were a group of sitting ducks. Dymodines had been blocked by the catmen—and that left them unarmed.

Then on the twentieth day, Stellor Downing gave the order to lift and head for the fourth planet.

In a close formation, the sixty-three ships arrowed into the sky, hit superdrive, and headed away from the sun.

They arrived above Four and began to look for trouble. They circled the planet twice, took a few

tentative stabs at the ground with their improved snatchers, and generally let it be known that they were there and seeking either their fellow or knowledge of his whereabouts.

The recognition detectors flashed Lane's trace, and they put direction-finding equipment into gear. They circled above the field upon which lay Cliff Lane's craft.

There was no sign of human life there. The spacelock was closed, and it could not be known whether from the inside or from the outside. Signals gained no answering flash, but the complete confidence with which they circled this field did get them an answer of sorts.

Beams flashed up, and spattered against the barriers of the flight. A pair of extra heavy battlecraft leaped out of underground slides and drove up into Downing's flight. The heavy beams lashed about, and four of Downing's ships folded over their torn midsections. Then Downing's ship answered fire.

It was not spectacular. The sphere of energy was not visible, nor was it heterodyned. It closed upon the midsection of the heavy battlecraft. It cut, quietly and with lightning swift precision. It moved, swinging on a force beam and taking with it a sphere of the battlecraft's middle—a perfect sphere, mirror-finished on the plates, girders, and equipment that met the surface.

The energy ceased and the perfect sphere dropped toward the planet.

Smoke poured from the gaping hole, and the battlecraft buckled, folded, and exploded like a bomb. Bits of broken ship spread far and wide, and the main mass fell back upon the spaceport.

It lay there, inert, smoke trickling from its shapelessness.

It was a blackened monument to two hundred thousand years of civilization.

The other battlecraft sped on through the flight unscathed. It looped high in the space above Downing's flight and crossed around, looped away and came back on the level against Thompson's group. It drove in through the flight, lashing sidewise at Thompson's ships.

And four of them reached out and sliced four large spheres from the battlecraft. Shredded, the ship died in the air. It disintegrated, and it rained metal parts for fifty square miles—a rain of smoking, shapeless masses of deadly steel.

"More?" snapped Stellor Downing.

Blatantly, the flight landed on the field, covered the other ships, and then waited for a move. As Downing said, "It's their move this time!"

The white ship landed in their midst. From it came Lane and his crew. The crew entered their ship, but Lane remained, waiting for Downing. In the crook of his arm he held a small, white-furred creature, and he stroked it gently with his free hand.

"Just lucky," grunted Downing.

"You talk big," retorted Lane. "But stay back, Downing. You're contaminated."

"Meaning?"

"You're alive with deadly bugs."

"Nuts. So are you."

"No I'm not. I've been sterilized within an inch of my life. Look," he said, holding up the Sscantovian equivalent of a guinea pig.

"Cute—but so what?"

"I've got the catmen scared of all Solarians—and from here on in, I'd hate to be any race that bucks us. Take hold of this animal, just for a moment."

Stellor Downing put his hand on the creature's back. He held it for a moment and then let go. Lane put the little animal on the ground and stood back.

"Well?"

"Wait a minute, will you? Even potassium cyanide takes time to kill—"

The little creature was running around, sniffing the ground and obviously looking for food. For three minutes it searched quietly, and then with a plaintive mew, it sat on its haunches and scratched its back. The plaintive cry became louder—and tufts of hair came from the back where the hind paw was scratching.

The creature scratched furiously—and succeeded in de-hairing its back, *in the shape of Stellor Downing's hand!*

"What in—?"

"Wait."

Downing looked at his hand in a sort of horror.

The scratching increased, and bits of skin followed the pattern of the bare patch. The plaintive cry became strident in a tiny voice. The little animal stopped scratching, turned over on its back and wriggled in the dirt of the spaceport. It wrenched itself back and forth sharply, and with squeals of pain. Its four feet opened and closed against its stomach, and the whites of its eyes gleamed.

A black patch appeared on the pink of the abdomen, and the paws scratched at the spot. It grew, and the pig cried continuously.

Cliff Lane took out his modine and blasted the suffering pig with a shake of his head.

Both he and Downing were a little sick.

"What—?"

"Fungus. As I gather it, the Solar sector of the Galaxy is alive with a violent evolution of fungus. We live in it, we breathe it, and we—eat it. They cringed in horror at what they found on the microscope slides, and this is the fourth pig I've killed. But I'm completely fungicided now, and I can handle 'em. But you see, Downing, you are alive with fungus spores looking for a place to live. They can't live on you, but what few that do escape the bactericidal action of the skin find it quite easy to go to work on an animal that has never been required to strive for life against fungi."

"Are the whole race like this?"

"No. Not entirely. But they haven't our strength against such—not by a jugful. They're right on the edge of the Solar sector, as I get it. They have some fungi, but it's nothing like the stuff we have on Terra. I think that Sol may be the

center—the evolution may well have started there, mutated there, and anything that grows elsewhere may be spore-born on the Arrhenius Theory to the rest of the Galaxy. Brother, we're tough!"

"Well, what have we accomplished besides killing guinea pigs, discovering a set of new weapons, and blasting the guts out of a couple of their best craft?"

Lane smiled. "I've succeeded in carrying over to them the problem of why we're here. They do not understand any more than we do, but they're willing to let us seek out the machine."

"What about blasting their ships?"

"Won't bother them too much. They'll rather enjoy the development of the slicing cut—after all their human appearance, they're still cats. They like to fight silently, and slash quietly, and then to slink away in the night. They're strictly predators, and their evaluation of life is rather low."

"So?"

"You may have to prove your prowess with a bit of fighting, Downing. Personal, I mean."

"Well—"

"And you may not. You've always accused me of being brash, bold, and impulsive. All three of 'em got me across to this gang. I've always accused you of being quiet, shy, and coldly-calculating. They'll like those features, too."

Three white-clad doctors surrounded Downing with their sprays.

"That stuff they have is better than the glook they sprayed me with," remarked Lane. "But it doesn't smell as good and it is inclined to sting a bit. They developed it after making me live in a glass-inclosed laboratory for about two weeks."

Downing submitted to the spray with scratching and shrugging. "Tell me," he clipped, "how're the women?"

"Cats," grinned Lane.

Downing grunted. "Sounds like 'sour grapes' to me."

"Frankly, they ain't bad, Downing. But a guy can't do much when he's living in a laboratory."

Downing laughed. "People who live in glass houses shouldn't."

"Shouldn't what?"

"Shouldn't—period!"

"Well, I intend to return after we get this thing off of our chests. This gang is not human. They aren't the kind you could trust, but they are interesting. It is really something to see their civilization—and to see just how catlike they behave. They never laugh. Their exhibition of amusement is a deep-throated purr. And when one of 'em gets his feet stepped on, he hisses like a couple of cats squaring off on the back fence."

Thompson came up, followed by the spraying doctors. "This is all very fine," he said. "But we've wasted a lot of time. The Little Men are getting quite nervous."

Downing looked at Lane. "I'm sort of glad you turned up," he said flatly. "Especially with permission to hunt that thing."

Lane smiled bitterly. "If I hadn't turned up, Downing, you'd have spent the next fifteen years combing this system for confirmation, wouldn't you?"

"Naturally. Now let's find that machine. I've got a little project of rivet-clipping ahead."

Thompson intervened. "Seems to me that you've both accomplished plenty. Lane here gained the confidence of the catmen and Downing has the fleet equipped with heavy stuff."

"Who?" asked Lane. "I have a hunch that it was your doing, Billy."

"And any confidence-getting *he* did was strictly fear of our natural environment coming here," returned Stellor Downing.

"All right, break it up."

"We're all to return here as soon as we get the machine destroyed," said Lane. "They want to know what the answer is, just as we do. I have a hunch that finding the machine itself will tell us plenty."

VII.

Toralen Ki turned from the communicator. "Hotang," he called. "They have the answer!"

"Good. Then our time has not been wasted! For now we have the other one back."

"The technicians on Tlembo have just given me full and complete instructions on how to lower the sensitivity of the detector to a proper level."

"Not shielding?" asked Hotang Lu skeptically.

Toralen Ki laughed. "What manner of shielding would stop the suppressor wave? Nothing, I know. Absolutely nothing can deflect or stop it."

Toralen opened the detector case and started to fumble inside. He was not deft, and the tools from the equipment case did not fit his hand. But in an hour he had made the changes suggested by the technicians on Tlembo—but aided finally by one of Thompson's crew of technicians who went to work on the thing with dexterity but complete ignorance of its principles of operation.

Then with the one detector in operation, in Thompson's ship, the flight took off and began to take the last measures necessary to the completion of their task.

Hour after hour they went, out into the space beyond the last planet of the catmen, and out and out, running slowly so that they would neither collide with the machine nor overrun it.

It was a matter of days.

"Dead ahead," said Thompson on the communicator.

"Target?" asked Lane.

"Meteor, it looks like."

"Might be camouflage," suggested Downing. "Remember if it must be destroyed, it is a sign that those who made it knew that it would be against the wishes of *somebody*."

"Did either of you think that it might be a good thing?"

"You mean the machine might be benign?"

"Yes," answered Thompson.

"That's why you are going to analyze it before we destroy it," said Lane.

"Yes?"

"If we destroy it and discover it is benign, then we can reproduce it. Follow?"

"Excellent idea," said Thompson. "Kennebec thought of that?"

"Kennebec is a smart man," said Lane. "He wanted the stuff in the Little Man's ship—stuff none of us can understand yet. He agreed to come out here and blast the machine. But he considered it likely that the Little Man was making a cat's-paw out of the human race and he wanted to repair any damage done as soon as we found out we'd made a mistake."

"Did you ever think that the interval between destroying this and getting the reproduction in working order might be just time enough?" demanded Thompson.

"Yup. I've figured all of that. But I'm following orders, Billy. I'm going to wreck that thing as soon as you tell me you can reproduce it."

Downing interrupted. "*You're* going to do it? I am."

"Want to bet?" snapped Lane.

"Cut it," said Thompson.

"Make you a deal," said Lane, ignoring Thompson.

"Go on."

"I order you to stop it," snapped Thompson.

"Go fly a kite," growled Lane. "Look, Downing, I'll fight you for the privilege of destroying that machine."

"Deal. How?"

"When Billy has his pictures and data, we'll take off in our fleeters. The idea will be to see who can blast the thing first—no holds barred, right?"

"It's one way of finding out who's the best flier," agreed Downing.

Toralen Ki looked up at Thompson. Billy smiled. He made motions, conveyed the idea to the Little Man that Downing and Lane were going out to destroy the machine personally.

Toralen Ki fumbled for the meaning and then understood. He agreed vigorously, nodding and smiling.

"The Little Man here says to go ahead," Thompson said, into the communicator. "I'm supposed to be a buffer until this mission is complete—it will be complete when that machine is blasted. Everybody knows that you fellows are going to go rivet-cutting sooner or later —might as well have something to do it over."

"Thanks," said Downing dryly. "And the guy that loses makes a public announcement of his inferiority, see?"

"I'll be listening to you," came Lane's taunting laugh.

"What you'll be hearing is my acceptance," returned Downing.

Thompson left them quibbling and took his crew over to the meteor that carried the machine. It was a real meteor, a huge one almost a half mile in jagged diameter. A well penetrated it, sealed by huge metal doors. They breached the

doors and resealed them, once they were inside, to pressurize the cavern.

Then they went to work on the huge machine.

It was bizarre. It was unreal and unearthly. Atomic generators powered it silently, pouring torrents of high power into its apparently senseless circuits. Great silvery crystals twisted and distorted slowly under piezoelectric stress, and sputtered-silver contacts carried off the impulses to other circuits.

Solid metal bars carried some sort of circulatory impulse from place to place—they were reminiscent of wave-guide plumbing but no microwave set-up could function in a system like this.

Then, slowly, the thing appeared to have pattern. Whatever it was, the output of the slowly-distorting crystals was fed in or out of phase through filters and transmission bars to the topmost crystal. It was multi-faceted and obviously not a natural formation. It scintillated and pulsed rapidly, and the facets gleamed against the lights as the crystal throbbed in tune with the feeding currents.

"This," said Thompson, "is going to be reproduced later if for no other reason than just sheer curiosity. Whoever built it is a little ahead of our time and I want to get caught up. Benign or malignant, it must be remade and studied."

Then for hours, Thompson's technicians went over the machine with a fine-tooth comb. Pictures—tridimensional shots, moving pictures, microtime film, and hand sketches. Technicians measured potentials, made pictures of wave shapes from the oscilloscope patterns, and drew endless schematic diagrams. Metallurgists took minute samples of the metals, of the dielectrics, of the crystals themselves, cutting bits out with microscopic modine beams.

Then, as they ran out of things to measure, Thompson took one last look at it. "O.K., fellows," he said, "can you rebuild it?"

"To the last decimal place."

"It's alien," warned Thompson.

"It's still made of metal and crystal."

"O.K." He turned to Toralen Ki and made suggestive motions. He turned off the main feed line, and the atomics thrummed to a stop. Then he suggested that now it was off, why didn't they just take it back to Terra and not bother reproducing it. Toralen Ki shook his head— No. He waved Thompson to come along, and they left the machine in the meteor forever.

"I'm finished," said Thompson, "but wait before you blast. The Little Man seems to want me to confer with him for a moment."

Thompson's ship took off. Toralen Ki emerged from his stateroom with the instrument. He planted it on a table, turned it on, and strapped the plate to his forehead. He offered the other one to Thompson.

Thompson understood. He knew that the Little People had a means of mental communication that augmented their speech. He accepted

the plate and strapped it on his own head.

"Now," said Toralen Ki, "I may at last converse with you and your race."

"What is the machine?" asked Thompson.

"The others—they are all right?"

Thompson nodded. "They are destroying the machine. Tell me, what is it?"

Toralen Ki nodded in agreement. "Tell them to destroy it and then to return, for I must speak with them through this, now that the machine is stopped and I may. But destroy it, for the Loard-vogh may have remote control and if they have, it may be started again at any moment."

"Before I blast any alien machine," said Thompson, "I must know what it is. You insist that it be destroyed. How do I know that the machine is not benign?"

"The machine," explained Toralen Ki, "is a device which suppresses the mental activity of all races within its field of radiation. It was built by a ruthless and predatory race to hold down the overall galactic mentality. It must be destroyed, for even though it is not running, full and complete regaining of the mental strength will not be possible until the machine is destroyed because a certain amount of residual power exists in the radiating crystal."

Thompson smiled, nodded, and went to the communicator. "O.K., fellows, have your fun. Blast it!"

Two ships circled Thompson's craft—two tiny ships, both as fleet as a beam of light and as maneuverable as thought. They circled one another, winding away from Thompson's ship in a tight twin-corkscrew spiral.

"Twenty thousand years ago—of your years—this race planned to conquer the Galaxy. They were an old race then, a mad race, with dreams of grandeur. Their numbers were countless, for they were spreading through their own section of the Galaxy like a mobile gas.

"They struck trouble, twenty thousand years ago. They hit a race that fought them—that almost succeeded in holding them to their line. Unfortunately, they were too numerous. They won. And then they decided that it would take many thousands of years of work to conquer the Galaxy. And in those years, younger, lustier races might evolve. Races that by sheer youth and strength might outstrip them. And so they made and sent forth horde upon horde of these suppressors.

"Your race," continued Toralen Ki, "has never been able to use its full mental power. That is because of the suppressor. True, you are a long way from the suppressor, but its power is fearsome and its effect is lasting. It passed through your system thousands of years ago and it held sway over your mental ability to now.

"Your race," said Toralen Ki, "is best equipped to fight the Loard-vogh."

"I don't feel any more intelligent

than I did before," objected Thompson.

"No, because you have been under the influence of the suppressor for countless generations. It has become an inherited trait. It will remain an inherited trait until the mentality of the human race is energized, or triggered by a rather powerful wave of mental energy.

"The Loard-vogh will enslave the Galaxy if they are not stopped. Our original home was overrun three thousand years ago, and fourteen times they have caught up with us. Again, Tlembo is being attacked, or perhaps it has not started yet. Fourteen planets named Tlembo lie in our history, and fourteen times have we combed the Galaxy waiting and seeking a race with the proper mental power and technical ability.

It would have been useless to energize your minds a thousand years ago, Solarian, for you had not the technical skill to accept it. The shock would have made you all mad. You believe me of superior intellect and knowledge because I have been able to make this machine. I am acknowledged the highest intellect among the Tlembians. I intend to sacrifice my intellect for humanity. The energizing will destroy me."

The meter in Lane's ship read forty. Forty miles per second. Dead ahead was the lacery of the star field, clustered around the tininess of black that was the meteor of the machine. Somewhere in the invisibility of space was Stellor Downing, coming this way.

He knew, because his detector said so.

This was not only a test of operator's skill, but of technical superiority, too. Detectors were not calibrated to the last foot of distance, and he who had the best capability in the art of tuning a detector knew better where the other man was at any time.

But it was also necessary to judge your opponent's error. For a single error would destroy both.

Downing's ship came. It was there and it was gone. Missed by a matter of feet.

And yet not a bead of sweat came. Neither had given ground. Lane grinned inwardly as his ship slowed for the turn. Dead ahead was the sealed door to the machine. He touched the button on his drive-rod, and the dymodine flared forth, bor-

ing down the shaft and driving great scintillating clouds of superheated gases up from the bowels of the meteor. The machine was blasted.

"You stinking opportunist," snarled Downing.

"Mad?"

"That was—"

"One step ahead of you."

"You haven't won—"

"Only succeeded. Now we can fight this out for good. Really want to play, Stellor?"

"I'll run you right into that hole in the meteor," snarled Downing.

The two tiny ships approached on a converging course. Collision course, it was, and somewhere far ahead there was the meteor again. Downing was on the spaceward side, and edging sidewise into Lane's course. Lane was pinched between meteor and Downing; edging outward into Stellor's course and calculated to miss the meteor by several yards—if he did not give.

At fifty miles per second they rocketed forward, approaching one another, and telling each other what was going to happen next.

The communicator in Thompson's ship told the story. Thompson heard it, and Toralen Ki understood it from Thompson's mind.

"They— Stop them!"

"I cannot," replied Thompson, with a smile.

"You must. They are necessary to our plan."

"Plan?"

"I am going to give up my intellect. Lane and Downing are emotional and psychological opposites. In one great burst of mental energy, my intellect will be expended. The shock wave from my mind will energize their minds. Their intellects will merge, making them emotional twins and psychological equals, each with the double power gained by joining with the other. They must willingly submit to this mental combining, for then the wave of energy from their minds in twin transfer will awaken every human in the Solar sector of the Galaxy."

"You're asking them to give up their identities."

"I am. And they must."

"They will never do it."

"You are stalling for time. Order them to cease. If either of them is killed, our plan may fail completely. Both of them are of the highest order of intellect—and of opposite psychology. That is necessary—order them to stop—*immediately!*"

Thompson laughed.

"I am willing to die for civilization. They should—" Toralen Ki looked at Thompson, and his eyes widened in wonder, fear, and finally horror.

"You are under control—the Loard-vogh!"

Thompson smiled affably. "The Terran known as Billy Thompson left this body when the machine was blasted," he said. "Previously I could but urge and draw him into agreement with me. And you, Toralen Ki, are also necessary to the plan."

Thompson's one hundred and

eighty pounds of fine body came forward. Thirty-seven pounds of Little Man shrank back in fear. Not fear of life—but fear for civilization.

And as Thompson's body reached for Toralen Ki, the radiation alarm blared. It registered; dymodines had been fired and simultaneous hits had been made.

Toralen Ki's free hand snapped the power of the telementor over full. Physical weakling though he was, he was aided mentally by the power in the mental transfer machine. He invaded Thompson's mind and fought the Loard-vogh intelligence that he found there.

Waves of mental energy spewed forth, and Hotang Lu came running to aid his friend. Stricken rigid, Thompson almost ceased to breathe; his heart faltered. For Toralen Ki and the alien Loard-vogh were using all of Billy Thompson's mind against each other; trying to drive the other out, calling upon more and more, even to the point of short-circuiting some of the voluntary sectors. It was battle, silent and fierce.

And the waves of mental energy spread in a vast radiation pattern as Toralen Ki and the Loard-vogh fought for the possession of Billy Thompson's mind and body.

TO BE CONTINUED.

IRON: RARE METAL.

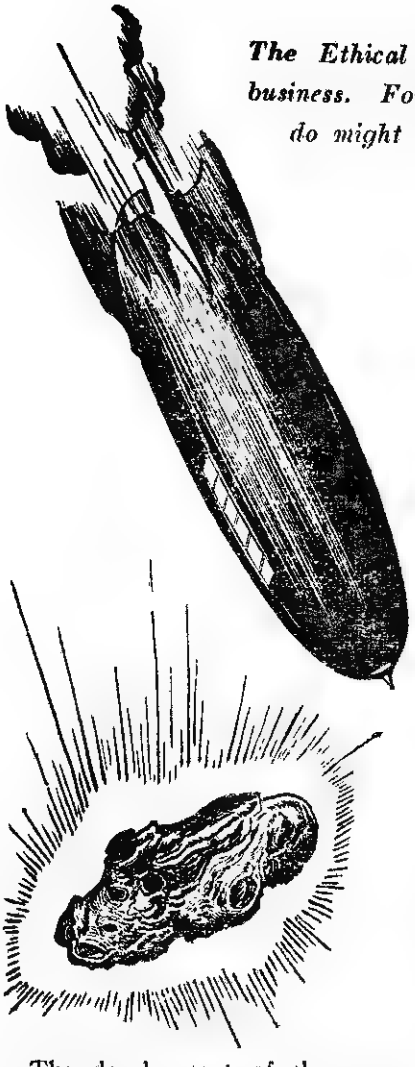
Iron produced by Westinghouse Research Laboratories during the war at the "mass production" rate of 1,000 pounds per year, was, to the metallurgical industries, as important as the Bureau of Standards time signals are to navigation. Plain, ordinary iron—only actually "plain" iron, in the sense of pure iron, is rarer than diamonds, fine pearls, or pure gold.

Iron has one of the most complex spectra known, and as a yardstick for spectrographic work is almost ideal, because it has many lines, closely scattered over the entire spectrum. Furthermore, because these lines are scattered, because iron is widely available, the lines have been measured with great accuracy by many laboratories. They serve s standard reference lines against which other lines can be measured, as an astronomer measures the position of a planet against the background of known stars.

Iron, unfortunately, also has one of the most nastily complex chemistries known. It's gregarious, and brings all its friends along when it goes through a chemical process. It's exceedingly difficult to get iron free of impurities—but exceedingly useful if it is.

"Four-nines" iron—99.99% pure—was produced by electrolysis of most specially purified iron salts, under super-special conditions. The final product of this contained some carbon and oxygen; these were largely eliminated by very nearly boiling the iron in an atmosphere of highly purified hydrogen, using electronic heating that could introduce no impurities.

The Ethical Equations were a curious sort of business. For instance, the only ethical thing to do might turn out to be insubordination!



Adapter

by

MURRAY LEINSTER

Illustrated by Williams

The development of the space-constant adapter is one of those things that has somehow had very little publicity. The Space Patrol Board was cagey when it happened, though, and with reason. It was shortly after a space-battleship of an alien race had been made available for examination by the Patrol, with surprising consequences. (Cf. "THE ETHICAL EQUATIONS," Astounding, June, 1945.) and the Ethical Equations had been elevated from abstract theory to somewhat suspicious validity. You know the general idea of the Equations, of course. Basically, they are a logically valid association of ethics with probability, and prove that favorable coincidences tend to follow actions of a certain pattern, and unfavorable coincidences follow those of other patterns. They are a mathematical demonstration of the soundness of the old adage, "Be good, sweet maid, and let who will be clever." The Patrol had had

the utility of the Golden Rule rammed down its throat—fortunately, through its practice by Jimmy Holmes, Lieutenant, Junior Grade, of the Patrol itself.

It didn't serve to make Jimmy popular with the High Brass.

However, for some time after, the Patrol was in what could best be described as a dither, which tapered off into no worse than a tizzy on the one hand, but rose to incoherence on the other. The Engineer Section ran around in circles, emitting subdued yelps of joy at the new gadgets it was getting, adapting, and adopting from the alien ship, and the others it suspected it would presently achieve. The staff was upset, but already some of the younger ambitious officers were boning up on the Equations and debating the effect of a halo of righteousness on their future careers. The more eminent, elderly members of staff were planning a commission for the Study of Policy On Contact with Nonhuman Cultures and trying to shove each other into innocuous desuetude on it.

Only Jimmy was really happy. He'd been taken from his assignment on the Luna radio-location station and was officially second-in-command of *TCC 107*—TCC means Traffic Control Craft—and there were eight men in the crew. And on a certain happy day his skipper, two whole years his senior, went off to Niagara Falls on a thirty-day honeymoon leave, and Jimmy was left in full command. And the stage was set.

Gatuna is one of the smaller asteroids, and in fact there are only two smaller ones which have the dignity of names. It had been sighted from the liner *Gatuna* on the Earth-Mars run, out in one of the spaces where there normally aren't any stray chunks of matter rolling around. The skipper of the *Gatuna* took telephotos and a scanner-beam analysis, piously named it after his ship, and duly reported and forgot it. Its orbit was followed by the Luna radio-location station after its establishment, but it had seemed fated to become just another of the seven thousand-odd celestial objects which it is easier to observe mechanically than to keep track of by computation.

Then, years later, on the third day of his unqualified command of *TCC107*, Jimmy Holmes was given a batch of assorted supplies and told to hustle out to Gatuna with them. There was, it appeared, an experiment party of the Engineering Section out there doing something or other, and they needed this stuff at once. A small space can like Jimmy's was the obvious messenger.

Eight days later Gatuna turned up in his vision screens, all rugged and irregular and with a wide belt of those ropey masses of frozen rock which have been found on at least a third of all the surveyed asteroids, and which nobody has ever explained satisfactorily. The traffic buzzer hummed stridently in the tiny control cockpit. Jimmy grunted, and turned it down. A traffic buzzer works on static fields, and it will report any drive tube

or normal motor within its range, unless both machines are grounded.

Jimmy took over from his quartermaster, started to make a loop around the asteroid, and spotted the Massen hut of a work party a quarter-way around. He killed forward momentum, dived with a nice appreciation of what his little ship would do, and brought up all standing just five yards from the hut. The fluorescent symbol of the Engineer Section glowed from the wall.

"E-vacuate cargo compartment," said Jimmy, in the sing-song of small space-can tradition. "Top men on watch to wrangle outside."

The ground, here, was solid nickel iron, and the magnetic grapples held the TCC firmly. Jimmy climbed into his spacesuit. He was outside in seconds. Tight-fit locks—which are practically molds of standard service spacesuits and fit so closely over them that no air space is left—are fast, because they don't have to be pumped. The loss of air is negligible. His two men followed him out. The little cargo hatch dropped open and the three of them hauled at the cables and marched to the Massen hut with a trail of bulky objects floating behind them. Gravity was practically zero, but magnetic soles made walking possible.

There was another suit lock in the hut. Jimmy went in. The inside was warm and brightly lighted. He opened his face plate and said politely:

"Reporting with supplies, sir."

There was no answer. But after a moment there were gobbling noises from a loud-speaker. They were ungodly noises. Unearthly noises. Unhuman noises. Then the same loud-speaker said:

"What is that? Who said 'reporting with supplies' and what is that other stuff?"

Another voice came out of the speaker, rather wearily:

"It sounded to me rather like a turkey-gobbler with the hiccups. But it doesn't seem probable, out here."

The gobbling came again. It had no vowel sounds and no consonants, but it varied startlingly in pitch between gobbles, and the gobbles themselves varied in duration. They stopped short.

"Lieutenant Holmes, Junior Grade, reporting with supplies," said Jimmy distinctly. "I wouldn't know about the gobbling, sir. I'm in the Massen hut, and I heard it on the speaker."

The loud-speaker said relievedly:

"Oh— We'll be there in a couple of minutes, lieutenant. Pile up the stuff and we'll sort it out. Tie it to something, by the way. There's no gravity."

"So I—" began Jimmy. But the gobbling began again—and then was abruptly cut off in mid-gobble.

He closed his face plate and went out through the suit lock again. He waited, and as he did so regarded the *TCC107* with enormous pride. She was rather small and distinctly rotund, but she bore honorable scars. The space cans which do the dirty work of the Patrol are never quite in perfect repair. It is a tradition

of the Service that they should be somewhat battered and somewhat grubby. But she was Jimmy's first if temporary command. He was vastly proud.

Five minutes later he saw three spacesuited figures. Reaction pistols guided and propelled them in flight. They landed and their magnetic soles made contact. They stood erect, seemed to stare at Jimmy, and then motioned toward the lock. Again he went through in seconds. You simply step into the mold, put your space boots in stirrups, and lean back into one half of it. The other half closes upon you and opens almost instantly, and you're through. Jimmy stepped out to hear the speaker:

"He had his phone turned off. Is that space-can tradition?"

Jimmy flushed, and another voice said:

"Shut up."

The suit lock heaved and a spacesuit came in. The lock made soughing noises and heaved once more. A second spacesuit. Then the third. Their helmets came off. The leader nodded.

"Hello. Glad you came. Is the invoice complete, or did we have some items disallowed?"

Jimmy handed over the invoice. He held himself stiffly at attention. The Engineer Section is highly informal among its own members, but very stiff-necked with the rest of the Patrol, and these were senior officers.

"For once, everything we asked!" said the leader. "My name is Fallon, by the way, lieutenant. Commander Fallon. What did you make of that gobbling?"

Jimmy shook his head. One of the others—Jimmy knew him later as Lieutenant commander Bliss—said hopefully:

"Lieutenant Holmes, did you notice anything at all odd about the . . . ah . . . aspect of this place as you came up to it?"

"No, sir," said Jimmy.

"We'd almost enough power," said Bliss woefully. "Something should have showed! If that extra generator doesn't step us up to the critical point, we might as well go home and twiddle our thumbs!"

The third man said meditatively:

"Er . . . lieutenant, you don't by any chance fancy yourself as an imitator of barnyard fowl, do you?"

"No, sir," said Jimmy stiffly. "The gobbling noise was outside, sir. It cut off just as you said you'd be back shortly."

"So it did—" Then Bliss said startledly. "It cut off as I threw the switch of the adapter!"

The three of them looked at each other. They grinned. They solemnly shook hands. Jimmy stood at attention, but Fallon said exuberantly:

"Rest, lieutenant. This is beautiful! Who's going to go back and turn it on again!"

Carter, the third man, put back his helmet and went to the suit lock. Fallon began to wriggle out of his spacesuit, beaming. Bliss slipped out of his like an eel.

"Tell your men to go back on

board and wait, lieutenant. The supplies can wait until we see about this."

Jimmy, blushing privately, turned the stud of his helmet phone and gave the order to his men outside the hut. It was acknowledged. Just then the speaker said in Carter's voice:

"Landing now."

Bliss explained offhandedly:

"We're out here, lieutenant, to try a trick Carter dreamed up. The visitor—the spaceship that came from nowhere—had some weird gadgets that used principles we thought could be differently applied. We're trying a new application of one of them. In theory it should change some of the constants of space. Mass does that, of course. Magnetism ditto, and even electrostatic stress. But we've been looking for rather more marked effects. Apparently we hadn't enough power and we asked for a step-up generator, but that gobbling, now—"

"Landed and ready," said Carter's voice.

"Go ahead," said Fallon.

"It's on," said the speaker.

Nothing happened. The speaker was silent. Then Jimmy said:

"Nothing was coming out of the speaker when I entered, sir."

"Mm-m-m," said Fallon. "I was last man out, before, and I'd been talking to the others. I suppose I left it turned on. We'd tried what we thought was a hopeful hookup, but when nothing happened we were too disgusted for speech. So . . . Ah!"

Gobblings broke in. They were different, now. There were two separate gobblers in action at the same time. One went on almost continuously, and another chimed in and cut out again. Then there was a pause and a third, much fainter, gobbled briefly.

Carter's voice came out of the speaker:

"One of those birds, besides hiccups, had asthma. Satisfied?"

Fallon grunted.

"It comes only when the adapter's on, anyhow. Come on back. You might as well turn it off again. We have to debate."

Bliss said softly:

"Won't Painted Jaguar be surprised?"

Fallon choked with laughter. Then he said to Jimmy:

"This is an historic moment, lieutenant, so it should never be told about as it really happened. It would make for irreverence—and nicknames for admirals are frowned upon. Remember! Now get out of your suit and join us. I think this rates a drink."

He opened a cupboard and brought out glasses.

"We'll wait for Carter. After all, he dreamed it up. But—think of it! Fleet Service picked up an alien spaceship and patched it up and sent it home again, but we've picked up aliens!"

Jimmy's eyes grew round.

"You mean, sir—"

"It is beautifully obvious!" said Fallon zestfully. "We thought we'd change the constants of space,

and we thought if we changed them enough we might make a new space—a sort of miniature universe—around our space-constant adapter. So we picked out Gatuna in case of accident. But we hadn't quite enough power, so we only tuned to a different space that already exists! Long radiation would be the first to fit the constants of two dissimilar spaces. Our space phones use it. When our adapter's turned on, long radiation is common to two spaces—and the other space has things in it that gobble over long radiation! You see?"

Jimmy swallowed. He looked enviously at his senior officers. He would almost—almost—have liked to be one of them. But no junior grade fleet lieutenant, in even temporary command of the most battered of space cans, would really change his lot for anything else. Jimmy's wavering was only momentary.

Fallon sent a space radio message to Base asking assignment of *TCC107* to temporary duty on Gatuna. It was Jimmy's idea, and he urged it yearningly. But he had good reasons. If not enough power on the adapter tuned long radiation to two spaces at once, then adequate power might tune electrons themselves, with their wave lengths down to .05 angstrom. And that would mean the physical transfer of matter from one space to another. But there was substance in the space the adapter was tuned to, because of the gobblings. And two things cannot occupy the same space at the same time. Wherefore—

The reasoning was good. So when the new generator was hooked up, the *TCC107* took off. She went off four thousand miles and Fallon sent a space radio signal that actuated a relay on Gatuna. The asteroid seemed to flicker, faintly but visibly. He sent a second signal, and the asteroid winked out—ceased to be. For half a second, space was empty where it had been. Then it came back.

The *TCC107* dived back to the restored hunk of nickel iron and stone which was an extremely minor planet. Bliss went out over the adapter, to gather up the recorder placed there. Bliss went to ground—by reaction-pistol power—over the second, and Fallon over the third. Jimmy landed the space can by the Massen hut and was inside and pulling out photographs before the others came back. Gatuna was just over three miles long in one direction, and one mile in thickness, so that nobody could get very far away, however. He heard Fallon observe:

"I'm just thinking that it was lucky we were dealing with space, and not with matter, or the power we had wouldn't have had much effect."

Carter's voice came, equally loud and equally clear from the other end of Gatuna.

"I'm going to cut out the last generator so we'll hear if our little trick stirred up our feathered friends."

Bliss arrived, and came through

the suit lock. The recorder he'd picked up had to come in through the parcel lock, of course. Jimmy put the photographs in the fixer, and waited for them to come out.

The speaker suddenly emitted bedlam. Hoots, gobbles, whistles, and every conceivable sort of organized sound came out of it. They speeded up to what was practically a blur of sound. They slowed to a vast deliberation, each note sustained and loud. The noises, as noises, seemed to be trying to accomplish something. Bliss turned down the volume.

"It would seem," he said, when he got his helmet off, "that we created some small stir."

Gatuna was literally millions upon millions of miles from any other object in the universe of which the Earth is a part. It was remote and isolated beyond imagining. On its rent and twisted surface the sun shone coldly, hardly more than a bright star. Mars was on the other side of its orbit. Saturn was at nearly as great an angle. Jupiter was a flyspeck with a barely perceptible disk. There was nothing nearby. Nothing! But a multitude of gobblings came out of the speaker.

Carter came out of the suit lock, jerked off his helmet, and rubbed his ears.

"Our fine feathered friends are throwing fits," he said. "What do the pictures show?"

Jimmy unrolled the recorder pack and held the film strip up to the light. Fallon came in and instantly reached for it, his helmet still sealed. He was looking as he wrenched it off. He whistled. The other film packs came out and were spread out on the table. The four of them looked. There was silence in the Massen hut while the now-muted noises came out of the speaker. They were incredible, those gobblings. They were unearthly. They were agitated. They were excited. And there is no word to describe their urgency.

"There's nothing in sight on the films," said Fallon. "Nothing nearby, anyhow. There's a sun, not too far away, and I suspect some of these star images are actually planets. But I should think it would be safe for us to stay on Gatuna while we turn the adapter on full-strength again. Agreed?"

Jimmy sat at the control board of *TCC107* while the extra generator was again hooked in to the space-constant adapter. It was strictly a terrestrial device, that adapter. The alien spaceship from which its basic principle had been learned had had tractor and pressor beams. Those beams, necessarily, meant alteration in the local constants of space, just as a gravity field alters the qualities of space about its central mass, and as a magnet alters space about itself. But the basic principles of space-constant alteration had been involved in the design of a tractor-beam projector. The Visitors had designed the beams as weapons and apparently had not seen beyond their immediately practical possibilities. But the Engineering Sec-

tion of the Patrol wanted to understand them. They wanted to play with every potentiality the basic principles might contain. The experiment on Gatuna was a case in point. Nobody could possibly anticipate the result. Any prediction would be a guess. So three Engineering Section men had come out to try it, millions of miles from the nearest solid object and—in the current positions of the planets—not even near a traffic lane.

The little ship's space phone was turned on so that Jimmy could communicate with each of the three on the asteroid's surface while they, of course, could talk freely with each other even in emptiness. The eight-man crew of Jimmy's command was alerted and at action stations. But the ship remained grounded—anchored by her magnetic grapples. The distance to which the space-change effect would extend was not known. If the ship was needed, it could take off after the effect had shown up.

Carter's voice came through the speaker close by Jimmy's ear.

"All set, everybody?"

Fallon commanded:

"Go ahead!"

An instant's pause.

"Here goes!"

The generators took hold. There was no novel sensation at all. But the vision screen altered. Where the plate showed sky above Gatuna's surface, new stars appeared in addition to those already pictured. For an instant, they were dim. Then, as the generators' power rose from the first impedence-value, they grew brighter. They reached and surpassed the familiar constellations. And suddenly the familiar stars dimmed and swiftly were extinguished. There was an utterly new sky.

Jimmy realized that the traffic buzzer by his ear was buzzing stridently. He swallowed.

"It looks," said Bliss' voice calmly, *"as if it worked."*

Fallon's voice, as loud as the rest:

"From where I am, it looks like a perfectly normal universe. Stars of the usual colors and apparently the regular spectral types. There's one queer thing. A devilish blue-white flare just broke out. If it hadn't happened so suddenly, I'd say it was a nova. It's still flaring and still expanding. It couldn't be so far—"

"Nothing like that here," said Carter. *"I do see what must be a fairly nearby sun, and two or three things that may be planets. One may have an actual disk. I can't be certain."*

Jimmy said with a little difficulty:

"The traffic buzzer is sounding. That means there's a drive tube or motor working somewhere not too far away. It's not on Gatuna, because the generators didn't set it off. They're grounded. It isn't."

Fallon snapped:

"Direction?"

"It would be nearly overhead at the adapter," said Jimmy. He added carefully: "That would be in the general direction of the local sun."

Gobblings broke out again. One gobbler only, very deliberately spacing its notes. A pause. A long pause. Then frantic, frenzied noises, running the gamut of a dissonant scale.

"The angle's changing," said Jimmy, dry-throated. "It's either very near or moving incredibly fast."

"It wouldn't be where I see this flare?" demanded Fallon.

"It sounds like our fine feathered friends," said Bliss dryly. *"They might have spaceships."*

There was a strident clanging all over the little ship. Collision alarm. A moving body of appreciable size within fifty miles.

"Collision alarm, sir," said Jimmy formally. "Whatever it is, it's apparently the thing that has a drive tube or motor."

"Not the flare, then," said Fallon calmly. *"Eventful sort of place, this. I'm coming, lieutenant. Stand by, Carter, to cut."*

Bliss said dryly:

"I've got a 'scope on that flare.

Fallon. I can see it from my post too. It isn't an explosion. It's luminescence. Rings of light spreading out and enlarging from a central point. They light up some sort of surrounding nebulosity. I never saw anything like it before. The first flare is dying out."

Jimmy turned off the collision alarm. He said tautly:

"The spaceship—if that's what it is—passed directly overhead, sir."

The gobblings gave somehow the effect of desperation. Carter's voice cut through them.

"I haven't cut the adapter, though I can. I admit I'm curious."

Jimmy reported again.

"The supposed spaceship has changed course. It's the change I'd make if I were going into a power-orbit around Gatuna, sir."

Fallon grunted:

"Hold everything. I'm on my way."

Seemingly only seconds later he came in the suit lock. He said curtly:

"I saw the thing as a speck. It is in a power-orbit not more than a few miles up. It's steering all over the sky —the craziest orbit you ever saw—unless the creatures in it think we're likely to shoot at them."

Bliss' voice through the speaker once more.

"Another flare out from the sun. It's the same thing—waves of luminescence radiating out from a center. It looks like chemical luminescence to me, which sounds insane. The first flare you saw, Fallon, seems to have gone out. The second is already dimming."

The gobbling suddenly ceased, with an effect of despair.

"They may hear our voices, sir," said Jimmy awkwardly, "on the space phone. It's taking a chance, but they may suspect we are trying to communicate with them, so they are trying to communicate with us. They may hear my voice now. If I take off the ship and go out to them—"

"They haven't tried to blast at us with anything," said Fallon. "Probably you're right. Carter! Bliss! We're going to try physical contact with that thing circling Gatuna. If anything happens to us, cut the adapter and report to Base and ask orders."

Carter's voice was angry:

"Swashing your rank around, eh?"

Bliss said dryly:

"But I get it for an instant in my 'scope. You're going to be surprised. Bring it back, Fallon. It's interesting."

Fallon muttered, "What the devil?" and nodded to Jimmy.

"Take her up, Mr. Holmes."

TCC107 rose from Gatuna into alien skies.

There were the four of them, all spacesuited, regarding the object the little space can had brought back in the grip of its magnetic grapples. The *TCC107* lay forty yards away. The Massen hut was but ten yards this side. The thing from space—which had come in unresisting—lay in a little depression in the blackened metal surface of Gatuna. It was thirty-odd feet long, of which ten

feet was a globe of welded steel. The rest was unfamiliar but recognizable—drive tubes and fuel tanks and a control bank operating from a star-shaped stern antenna. The working parts of a device designed for navigation in empty space were not inclosed. They were open to emptiness. There was no unwelded seam nor any crack by which anything in the ten-foot globe could emerge to make adjustments or repairs.

There were no more gobblings. There was only the faint humming of the space-phone receivers in the helmets, and occasional startlingly distinct noises of movement inside the men's spacesuits, or contacts of those suits with solidity.

"A robot, of course," said Bliss.

"And no feathers," added Carter dryly. *"This gadget is a scanner, though, and this sends the images back. It's remote-controlled, of course."*

"What we're all thinking," said Fallon, *"is that it's a sort of torpedo, a weapon. But this"*—his space-gloved hand pointed—*"is a compass. Apparently it picks up and amplifies a magnetic field and feeds its results to the control bank that handles the drive tubes."*

Their helmet phones emitted a single gobbling note. A relay clicked and something moved. There was another, differently-pitched gobbling and another relay clicked and another control moved. A third, fourth, fifth— In succession, single notes sounded in their helmets. and successive relays moved.

"Looks like a demonstration," said Fallon. *"They probably have images of us from their scanners, at that."*

Jimmy said uncomfortably:

"If I may say so, sir, if this is a torpedo, and if they mean it to destroy us, they could set it off any time."

"You mean we should dismantle it," said Fallon curtly. *"We shall."*

"No, sir," said Jimmy awkwardly. "I meant to point out that they didn't want to destroy us, and still don't."

A gobbling came. Two notes, a pause, two notes, and then four notes. One relay in the spidery array of exposed machinery clicked over faithfully after each sound. Then three notes, three notes, a pause, and nine notes one after the other. Then four notes, four notes, and sixteen notes together.

"Squares," said Bliss dryly. *"They're gobbling elementary math at us. I want to see into the relays that sort out those gobblings to appropriate controls."*

Jimmy moved to be in the field of what was plainly a scanner attached to the extraordinary thing. He clapped his gloved hands together. Five times. Five times. Then twenty-five times.

There was a long pause. Gobbles. Six, and six, and thirty-six.

"Good work, lieutenant," said Carter. *"They skipped the square of five, since you gave it to them. They're communicating interestingly but not very informatively."*

Desperate gobblings came in the space phones, and every relay in

sight worked madly. The gobbling ceased, and two notes, two notes and four came, then three and three and nine—and then the gobbling which clicked all relays madly.

Jimmy said diffidently:

"It looks, sir, as if they're telling us that they are rational creatures, by reeling off a series of squares. And then they tell us they want this thing to work again."

"Ah!" said Fallon. *"We're going to take it apart to see what's wrong with it."*

Jimmy said:

"I . . . think I know what it is, sir. That compass arrangement. It would detect magnetic fields and feed the result to the controls. Gatuna is largely nickel iron, sir, like the core of Earth. It would have a magnetic field. It appeared very suddenly in this space. If this . . . torpedo, sir, was on its way somewhere, and was intended to veer into anything with a magnetic field, it would swerve toward Gatuna. Perhaps it did. But perhaps it couldn't turn sharply enough, so instead of crashing into the asteroid, it went into a power-orbit the size of the smallest circle it could turn."

"If it was intended," said Carter, *to operate so far from its control board that there'd be a long time-lag, you might be right, lieutenant."*

Jimmy sweated inside his space helmet.

"If . . . if we human beings," he said embarrassedly, "had sent out a space torpedo to destroy an enemy, sir, and something appeared in our space which captured our torpedo and we hadn't time to get another made and on the way, I think—"

Fallon said dryly:

"Are you by any chance quoting the Ethical Equations at us, lieutenant? They were very useful once, we all agree. But there is a general order in force, since that Visitor appeared, that any artifacts of an alien culture must hereafter—with all due precaution—be placed physically at the disposal of the Patrol Board. A cockahoop Fleet lieutenant sent the devil of a lot of highly useful isotopes off into empty space not long since. The Engineers would have liked to have them. That won't happen again!"

"The . . . creatures who control this, sir," said Jimmy unhappily, "haven't threatened us. They've . . . really appealed to us. If they have an enemy, and this is their defense—"

"As humans," said Fallon curtly, *"we are necessarily neutral in non-human quarrels. And we have our orders—not specific for this case, but definitely applying. We are going to disassemble this contrivance and take it back with us."*

"But we're not neutral, sir," insisted Jimmy miserably, "if we intrude into their space, capture a weapon, and make it useless!"

Fallon's head turned inside his space helmet. His expression could not be read, but his voice was crisp.

"You are under arrest, lieutenant," he said shortly. *"Return to your ship and remain there! We'll handle this!"*

Bliss and Carter were silent.

Jimmy marched to the ship's suit lock. He vanished inside it. Seconds later he said formally into the space-phone transmitter in the control cockpit:

"Sir, it is Space Patrol tradition that an officer ordered to his ship is automatically released from charges and arrest. It is also Space Patrol tradition that an officer cannot be accused of disobeying an order if he does not receive it. My space phone goes off now!"

There was a click in the helmets of the men on the asteroid's surface. The *TCC107* lifted. It maneuvered over the bulky robot. It lifted again. Gravity was negligible here, but inertia had to be counted. The little space can struggled up and away. It sped for the alien sky.

Helmet phones hummed, where three men were left behind.

Carter's voice said:

"Now his little heart will break because he's been insubordinate. I've been worrying about that, too, Fallon. But why do it this way? I think he was right."

"And so do I," said Fallon blandly. *"But disobedience of orders is a sight more serious in a commander than a lieutenant junior grade. Skippers of little space cans are expected to be cocky. It's tradition. Have you ever seen a good man in the Service who hasn't been under charges?"*

Bliss observed:

"They don't get to be admirals."

"Now, who," demanded Fallon, *"wants to be an admiral?"* Then his voice changed. *"The thing in my mind is that the line that robot was traveling on is between the brightest planet and the area where we saw those flares. You see?"*

The *TCC107* was the tiniest of specks. Gobbles came through the space phones. Tentative, somehow hopeful gobbles. Then firmer, assured ones. The tiny speck which was the *TCC107* and its burden seemed to split into two. More gobbles. Brief and somehow specific ones.

"He headed out," said Carter, *"at right angles to what would be the magnetic lines of force of Gatuna. I like this boy, Fallon. If our fine feathered friends know their stuff, their robot should head right away and go on about its business."*

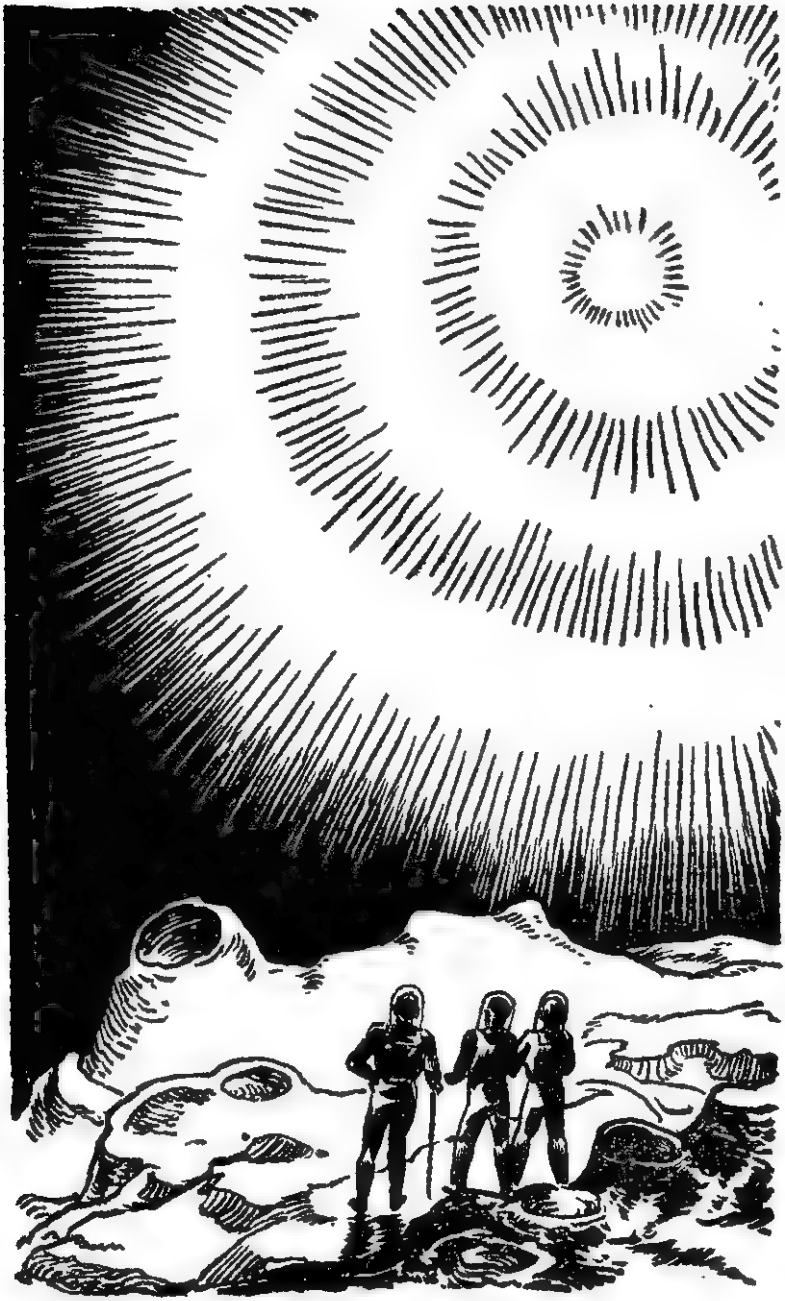
"I," said Fallon, *"am curious to know what will happen when that robot hits the area where we've seen flares. Any more of them, Bliss?"*

"Yes," said Bliss' voice in the helmet phone. He was bent over a portable 'scope. *"The rings of light expand a good deal faster than they did. That should mean that whatever it is, is nearer."*

"We wait," said Fallon's voice in the space phones.

The three clumsy, suited figures stood on the nightmarelike metal soil of Gatuna, anchored to it by magnetic soles. They watched what would have been the northern sky, if there had been a north and south on the tiny asteroid. A flare showed suddenly among the alien stars. Even to the naked eye it was, now, a series of expanding rings of somehow cold and horrible light.

The *TCC107* came to a brisk landing behind them. It settled on



its grapples and was still. Jimmy's voice said formally:

"Reporting, sir, space phone repaired. Ready for duty."

"Watch the sky where we're watching," growled Fallon. *"We'll take up your insubordination later."*

"Yes, sir," said Jimmy in a small voice.

They waited. And watched. And waited. From time to time small gobbling noises sounded in their ears.

When it happened, it did not seem at all probable. The sky was black with the complete blackness of empty space. The thin rays of a far-distant sun smote starkly on the tortured, riven surface of Gatuna—long isolated in its own solar system, but now infinitely more remote from companionship in an alien cosmos and beneath unknown stars. The stars were infinitely tiny pinpricks of light, and their patterns were utterly unfamiliar. There was no Milky Way.

To trained eyes, indeed, it was evident that this galaxy was small by comparison with that of which Sol is a part. And it was remote beyond comparison. There were not even any nebulas in this sky, as indication of neighboring islands of space.

No. There was one patch of nebulosity. It was, strangely, where a brilliant, flaring, but gradually dimming series of pulsating waves spread out from an apparently motionless center. The scattered light from those spreading ripples was vaguely and very dimly reflected from space nearby. It amounted to a trivial cloudiness against the black of emptiness beyond. There was even a shape to the cloudiness, but not a shape to which one could put a name. It was irregular like a cumulous cloud-patch, like a blob of —something. Stars behind it seemed slightly dimmed.

"I don't like that thing," said Carter suddenly in the space phones. *"It's too close to be a nebula. I have a sort of nasty feeling about the rings of light in it. I think I prefer our gobbling friends."*

Fallon grunted wordlessly.

Suddenly there was a flare which —after only instants—abruptly had at its center a tiny spot of reddish light. Not bright, that new tint, but a clear reddish-yellow speck which looked hot and angry and belligerent. It winked into being. Then it spread. Swiftly. It dimmed from yellowness to a diffused red glow like something in a furnace. The lurid center died away, but the red glow spread and spread.

The glowing thing moved, its redness sweeping over it like swift destruction. The entire substance of the shapeless mass glowed and writhed. It seemed to contort itself in some vast, soundless agony. It sent out billowing pseudopods of tortured color. It seemed to rend at itself. It writhed again, blindly and horribly, and went into gigantic pulsations which tore parts of itself free—each separated part continuing in miniature the spectacle of maddened suffering the parent mass portrayed.

It went on for a long time. Grad-

ually, it tended to die. Once a flare began, and greenish ripples of light essayed to spread out, but they were overpowered by an increased angriness of the red which now seemed to contract and grow more fierce.

It dwindled, and dwindled, and at last there was only a spasmodically heaving red glow which seemed to rouse itself to convulsive, futile stirrings.

Then it went out.

There was silence for a long time. Jimmy, staring at the vision-plate in the space can's cockpit, swallowed noisily. Bliss' voice came with exceeding dryness from the space-phone speaker by his head:

"The robot we saw was designed to plunge at any magnetic field. It had a welded-steel head, with no detonator that we saw. I am thinking, my friends! When it went into that thing, it made a flare—and then it turned red. I began to suspect that the Thing was alive, and that it liked iron. It fed on iron. A living thing that craved iron would have a magnetic field in place of senses. Iron might be drawn to it, or it to iron. And maybe those flares were iron meteorites being consumed. Maybe the robot went into it, and its welded-iron coating was consumed, and whatever was inside it was released to get to work. And it killed the Thing. Our feathered friends meant it to. They needed it to. After all, if a Thing like that consumes iron, and their planet is like Earth in having an iron core—"

His voice died away. Fallon said shortly:

"Mm-m-m. It would have relished Gatuna. And our spacesuits. It might have had a splendid time here. If we turned off our adapter after it struck, either it or part of it would have been turned loose in our space. Plenty of iron in our solar system! Even if we didn't turn off the adapter, after it had consumed part of the machine it would have gone off by itself—"

Carter said with entirely false disapproval:

"No feathers! Fallon, let's go home! I heartily approve of the barnyard fowl of this universe, but I'd like to take a look at old Sol again, and I would like to raise hell with somebody back at Base just for old time's sake. We can come back

and talk to the gobblers later. Opening communication with them, after all, is an Intelligence Section job."

"Go turn the adapter off," said Fallon's voice.

He went to the *TCC107*. He went in the suit lock. Jimmy stood up and saluted stiffly.

"Well?" said Fallon formidably. "You were quite right. I suppose you'll make a report. Proud, aren't you?"

Jimmy swallowed.

"If you don't mind, sir," he said anxiously, "I'd . . . I'd like to square it if I can. I . . . I was insubordinate once before, and . . . there was a lot of row, and . . . it might be thought I was trying to show off—"

Fallon blinked.

"Your second performance, eh? Oh-oh!— Your name is Holmes! That Holmes, eh? Hm-m-m— And you're not proud?"

"No, sir," said Jimmy. He added wretchedly. "I've got an uncle who's a politician, sir, and he's always trying to push me, sir, and it's a . . . a handicap. If I can just avoid being noticed, I'll be much better off in the Patrol, sir. But the . . . Ethical Equations did work once before, sir. I . . . couldn't help thinking they were just as important now. I'm . . . sorry, sir."

"Hm-m-m,' said Fallon. He studied Jimmy coldly. Then, presently, he grinned slowly. "The Ethical Equations, which point out that coincidences aren't wholly coincidental, also indicate that it is the duty of senior officers to keep junior officers from getting too good an opinion of themselves. While they are humble they do not happen, coincidentally, to make quite so many expensive mistakes. But you do not look particularly puffed up. So I will say that you did a good job, in spite of being the hardest junior officer to drive into insubordination I ever saw."

Then he held out his hand.

That ended it, of course. The uses of the space-constant adapter are familiar enough to everybody, today, even though exactly the constants which lead to the cosmos of the gobblers haven't been hit again as yet. The first adapter was a hit-or-miss affair. But this particular story has never been told before. Too much praise for Jimmy would not only have made him uncomfortable—he might have come to like it. So there was no official mention made of it at that time.

But his two-year-senior skipper, reporting back to the *TCC107*, found a promotion awaiting him, and Jimmy Holmes kept her as his first command. Which, of course, was quite as much as was good for him, and much more than he'd hoped. And the complete details of the affair went into Space Patrol records and were duly noted—and largely disregarded—by the policy-making body. But they did have a certain tendency to make the Ethical Equations just a shade, a bare shade, more nearly an acceptable reason for doing things.

So that was all right, too.

THE END.

The guest wasn't invited, but then, the house was really a guest—in the time era of the intruder. The guest's great trouble was he didn't know the difference between knowledge and mental agility—

Guest in the House

Illustrated by Williams

by FRANK BELKNAP LONG

Roger Shevlin set down his bags, shook the rain from his umbrella and wondered just how long it would be before he found himself consulting a psychiatrist. He'd made mistakes before—plenty of them. But he was essentially a man of sound judgment, and it was hard to believe he could have allowed himself to be talked into renting a twenty-room house.

He was amazed at his own incredible stupidity; the lack of judgment he'd shown right up to the instant he'd signed the lease and returned the pen to the renting agent with a complacent smirk.

A huge and misshapen ogre of a dwelling it was, with ivy-hung eaves and a broken-down front porch, and as Shevlin stood in the lower hallway staring up the great central staircase a shudder went through him. There was always a chance, of course, that the place would shed some of its ugliness amidst the changing colors of autumn and the sweet-warbled songs of meadowlarks and grasshopper sparrows.

But Shevlin knew that no one would ever refer to the place he'd leased as a "house." It would always be "that place the Shevlins settled in—the poor chumps!" or "Johnny, run over to the Shevlin place and see if Mrs. Shevlin has any butter to spare."

To add to Shevlin's woes, the children had brushed right past him, and were losing no time in making themselves at home. Children could take root and sprout almost anywhere and the Shevlin youngsters were hardy parennials six and nine respectively. Already the house was beginning to resound with yells, shrieks and blood-curdling whoops.

A man should be proud to be the father of two such sturdy youngsters, Shevlin thought, and glared at his wife.

"The place won't look half so bad when I get those new curtains ironed out and hung up," Elsie said, and could have bitten her tongue out.

"Thanks," Shevlin said, dryly. "I was waiting for that. Now, if you don't mind, I'll go down in the cellar and mix myself a rum collins."

"Why pick on the cellar," Elsie said, miserably. "There's nothing down there but a lot of rusty machinery which we'll have to pay someone to rip out and cart away. The renting agent said the last tenant was a professor of . . . of—What did he say he was a professor of, Roger?"

"Of physics," Roger grunted. "Perhaps if I go down in the cellar and surround myself with just the right atmosphere it will work with me."

Elsie stared at him. "What are you talking about?"

"The homeopathic system of therapeutics," Shevlin said. "If you have something bad, you dose yourself with more of the same until it either cures or kills you."

A queer feeling of insecurity took hold of Shevlin when he saw the cellar. It was damper than he'd ever thought a cellar could be. And chillier.

The machinery was damp, too. It was studded with little blebs of moisture and under the wetness was a rustiness which made Shevlin think of tin cans rusting in the sun, and an ax half-buried in a chopping block in an abandoned woodshed.

Ah, well—a gloomy life and a stagnant one was better than being cooped up in a city apartment with two small kids running around in circles every time the doorbell rang.

The machinery was really quite elaborate. So elaborate, in fact, that if Shevlin had been writing a book about machinery he'd have gone out and hired a ghost writer solely to avoid describing it.

Shevlin took another sip of the rum collins and wished that he were out of the cellar and upstairs in the attic. Of one thing he was certain. It would be sheer insanity for him to remain in the cellar when he could roam all over the house without let or hindrance.

Once as a child Shevlin had almost tangled with a bulldozer and the experience had left an inefface-

able impression on his mind. He had no intention of touching the machinery, or becoming embroiled with it in any way.

Clumsy hands he had. Clumsy hands and a clumsy head, early to rise and early to bed.

He must have stumbled, though it was hard to see how he could have been so unsteady on his feet after just one rum collins.

He had a vague recollection of making a frantic clutch at something huge that glistened. He had a much sharper recollection of feeling that something move beneath his fingers.

The whirring began immediately and didn't stop. It was faint at first, very faint, but it increased so rapidly in volume that Shevlin had no time to leap back.

For one terrifying instant he seemed to be standing on the brink of a colossal sandstorm, his ears filled with a dull roar that was half a silence. Then there was a flurry of scintillating metal particles, and something seemed to lift him up, and hurl him backwards through a cyclone of motion toward a tumbled waste of emptiness.

When Shevlin struggled to a sitting position the floor was once more firm beneath him, and the machinery had ceased to gyrate. For an instant the walls had seemed to contract in fitful gusts, but now there was nothing to indicate that a convulsion of incalculable magnitude had taken place on the opposite side of the cellar.

He was beginning to think he'd suffered a vertigo attack and imagined the whole thing when he heard his wife's voice calling to him from the head of the stairs.

"Roger, come up here quick! I can't see out of the windows! Roger, hurry!"

Shevlin gasped, got swayingly to his feet and mounted the stairs in five long bounds that carried him well past his wife, who had retreated into the lower hallway, and was staring at him out of eyes that seemed to fill her face.

"What do you mean, you can't see out?" he demanded.

"It's like a fine, dazzling mist," Elsie said, in a stunned voice. "You can see it best from the living room window."

The living room was filled with little dazzling dust motes that seemed to follow Shevlin as he crossed to the window, pressed his face to the pane and stared out with utter incredulity surging up in him.

"It can't be an ordinary fog," Elsie said. "It came up much too —*Roger!*"

"Yes, what is it?" Shevlin asked.

"The other pane!" Elsie almost screamed. "A little man with a horrible, shrunken face *looked right at me!*"

Shevlin swung about. "Oh, nonsense," he said, anxiously. "You're making a mountain out of a fog bank."

"But I tell you, I saw him! Oh. I did, I did! You didn't, but I did!"

"All right," Shevlin said, his mouth tightening. "Shock does strange things to the mind. I most certainly didn't see him, but I'm go-

ing right out now and puncture him before we follow him over the hill to the madhouse."

He turned as he spoke and went striding toward the front door. Seemingly the door had soaked up a stickiness, for he had to tug and wrench at it, and the knob kept slipping out of his hand.

But it came open at last, and Shevlin found himself on the porch staring wildly about him. As far as he could see there wasn't anyone in sight. But he couldn't see very far, for the fog was thicker than he'd ever imagined a fog could be. "Oh, my stars!" he muttered, through clenched teeth.

"You're just not used to *our* kind of weather," a wheezy voice said. "Climactic conditions change quite a bit in a half million years."

Shevlin caught his breath.

Directly in front of him the fog had thinned a little, and—he could see the little man standing there.

The little man wasn't a dwarf exactly, but he was well below medium height and his cranium bulged so that his face seemed much more shrunken than it actually was. It was sufficiently shrunken, however, to resemble a tissue-paper mask which some besotted reveler had bought as a hand-me-down, daubed with rouge and worn once too often.

He didn't seem to be wearing much in the way of clothes. Or perhaps it would have been more correct to say he had been ill-advised in the matter of clothes. From his scrawny chest to just above his knees a thin, one-piece garment—not unlike a sarong—clung loosely to his mummy-thin body, obscuring what it couldn't conceal and taking a little of the curse off. But his shoulders were completely bare, his elbows stuck out and his legs were visible in all their crookedness. He was entirely unshod.

"In another fifty years we'd have mastered time travel ourselves," the gnomish apparition said. "But now we shall have it right away."

"Yes, naturally," Shevlin said, blankly. "You'll have it—right away."

"I'm confident we will," the little man agreed. "You know the secret and will communicate it to us."

As though unaware that Shevlin had stiffened the little man bowed.

"Perhaps I'd better introduce myself. My name is Papenek, and I'm probably the only man on earth who could cope with a development like this. You see, the house didn't enter our time sector quite as fast as it left yours, so we had time to step up the beam and get a good look at it."

"You—"

"When we saw the house coming. Valt—he's our Chief Monitor—sent for me immediately. 'You can speak the language of First Atomic Age primitives as fluently as I can,' Valt told me. 'Take a tube and go right over there. If necessary, use persuasion.'"

The little man smiled. "Valt provides for every contingency. He wouldn't be where he is if he didn't. But I'm sure persuasion won't be necessary. You want to help us, don't you?"

Shevlin had no clear recollection of leaping back through the front door and slamming it in the little man's face. But he must have done so, because he suddenly found himself inside the house with his back to the door and his stomach crawling with cold terror.

"Roger, what is it?" Elsie said, in a shrill, small voice. "What did you see out there? Why are you staring at me like that?"

Shevlin turned abruptly, and twisted the knob of the door to make sure it wouldn't open behind his back.

"The little man I didn't think was there is standing out on the front porch," he said. "He says the climate has changed a bit because we're a half million years ahead of the clock."

"A half million—"

"Apparently the professor wired the house for time travel," Shevlin said, moistening his dry lips. "Cruel and thoughtless people sometimes leave litters of unwanted puppies in damp cellars for the neighbors and the health department to worry about. I'm simply guessing, of course. But I've a hunch the professor just didn't realize how close to success he was. When that huge clutter of machinery down in the cellar wouldn't work he must have got disgusted and walked out on it."

Elsie screamed.

The little man was standing just inside the door, his eyes riveted on Shevlin's twitching face.

"Wood is an extremely hard substance to make permeable," he said, as though he were addressing a child. "It has never ceased to amaze me that the First Atomic Age could run its entire course without collapsing such dwellings in their entirety."

"It . . . it's just beginning," Shevlin muttered, a little wildly.

"You mean the First Atomic Age. Yes, I rather gathered you hadn't advanced very far into it. Certainly not as far as the Great Holocaust, which wiped out all but a pitiful remnant of the human race."

"One redeeming feature, though," he added, as though he'd just thought of it. "The mutations which made our race possible began to occur right after the first atomic bomb was dropped."

For the first time Shevlin noticed that Papenek was clasping a small glowing tube about five inches in length. It wasn't elaborate—in fact, a test tube filled with light wouldn't have looked any different, except that there was nothing inside the tube to account for the light.

"Don't be alarmed," Papenek said, with a deprecatory gesture. "The house won't collapse. I used the beam so sparingly that it didn't even destroy the wall when I came through. As you can't see, all it did was make the wall permeable. I could walk out just as easily as I walked in, but—I've certainly no intention of leaving just yet."

Wide-eyed, Elsie turned sharply. "You hear that? He's going to *visit with us!*"

Papeneck turned, and stared at Shevlin's wife. "The tyranny of hysteria is the most crippling of all

tyrannies because the normal mind has absolutely no defense against it," he said coldly. "Fortunately we now know how to deal with such aberrations. Women are so highly replaceable that we have no scruples about—"

He was interrupted by sudden clatter on the great central staircase.

Down it came first Shevlin's only son and heir, Roger J. Shevlin, Jr., pulling after him a toy locomotive and three streamlined pullman cars. The cars bumped and careened perilously on every step and for an instant Shevlin was sure they would come uncoupled. It was curious, but just watching the train descend steadied Shevlin, so that his daughter's noisy appearance at the top of the stairs armed with his son's air rifle did not unnerve him too much.

What horribly unnerved him was the expression on Papeneck's face when Betty Lou Shevlin screwed up her face, and aimed the rifle straight down the bannisters at the little man from the future.

BBBRRUPP.

Though the bb shot hit Papeneck in the most delicate part of his anatomy he didn't budge an inch. Surprisingly he just stood very still, his lips sucked in and a doughy knobbiness sprouting from his face. Then, slowly, his features picked themselves up from where they had landed and regrouped themselves where the doughiness was most pronounced, giving him the aspect of a tormented half-wit.

"Children!" he said, icily.

"Y-you still have them, d-don't you?" Shevlin asked, a coldness encircling his scalp.

"Oh, yes, we still have them," Papenek said.

"I . . . I suppose you treat them differently than we do, though. Give them haywire toys to play with that turn them into pitiful little adult lunatics before they're six."

Being an imaginative man Shevlin had often tried to imagine what the children of the far distant future would be like. Despite his terror, despite the fact that Betty Lou was now tripping down the stairs in the wake of his son he couldn't repress a certain curiosity as to the young of the species which his own descendants had sired.

"No, we don't," Papenek said, a malevolent resentment in his stare. "The human infant has a long learning period. We . . . we don't try to telescope it. All we do is utilize it to teach a child the rudiments of civilized behavior. What amazes me is that you haven't utilized it at all. Your children are far more primitive than young orangutans or chimpanzees."

"Are they?" Shevlin said, and something in his tone made Papenek tighten his hold on the tube and take another swift step backward.

"I didn't mean to seem patronizing," Papenek said. "You First Atomic Age primitives must have had a quite astonishing grasp of scientific imponderables in some respects. Perhaps I should say 'hit-or-miss techniques.' In a crude way you've outdistanced us. Possibly a barbaric; not to say, savage

childhood has given you a certain mental resilience which—"

He was not permitted to finish. Betty Lou had dropped the air rifle, seized her brother by the arm, and was dragging him toward Papenek as though she wanted something confirmed which she didn't dare refer to in the presence of her parents.

"I tell you he has!" she shrieked. "He has, he has, *he has!*"

"Aw, he's just a dwarf," Junior protested. "Let him alone and he'll sing 'happy birthday to you' from the Western Union."

It all seemed like a dream, but Shevlin knew it wasn't. The bright, and shining faces of his brats were far too real and earnest.

And now Betty Lou was coming right out with it, accusing Papenek of having little knobby outgrowths at the base of his skull. Like horns they were, jutting out a good inch and a half on both sides of his neck.

Shevlin hadn't noticed them before. But now Papenek was fingering the growths, causing Elsie to squirm in horror.

"Directional organs," Papenek said, almost belligerently. "I'm not surprised those little savages should be upset by them."

"Directional—"

"They're vestigial in you," Papenek explained impatiently. "Cats, dogs and birds have a highly developed directional sense which our own ancestors lost far back in the Miocene. In fact, the bodies of all animals contain vestigial homologues of organs that were once functional. Certain snakes, for instance, have tiny skeletal legs buried under their skins, so incredibly minute as to present anatomical difficulties to a taxonomist."

"If he used any bigger words he'd choke himself," Junior said.

"If you're talking about snakes you needn't bother to tell us," Elsie muttered. "Just show us. Turn your back, Betty Lou. He wants to show us his buried legs."

"Directional organs are vestigial in you," Papenek said, ignoring the interruption. "But we've redeveloped them."

"Oh," replied Shevlin, his hands traveling to the bumps at the base of his own skull.

"Oh, don't," Elsie pleaded wildly.

PLOP.

Just why Junior should have seen fit to thrust out his leg and trip Papenek right at that moment was a riddle which the child psychologists of the future might have been capable of unraveling. But Shevlin doubted that.

He doubted it still more when he saw the look of fury on Papenek's face. The little man's features were so convulsed with rage that Shevlin feared his temples would burst.

A scream from Elsie warned him that there was no time to be lost.

Grabbing his son by the coat collar, Shevlin swung him about and started toward the stairs with him. He had little hope of reaching the top of the stairs before Papenek could regain his feet. It was more an act of appeasement than anything else, and like most such acts

it failed utterly to achieve its purpose.

He saw Papenek's hand go out, but he wasn't prepared for the blinding flash of radiance which shot from the tube.

He himself wasn't touched. Only Junior was touched.

For an instant Shevlin's son was bathed in an unearthly refulgence. Then—Elsie was babbling and clawing at Papenek's face, and a little wisp of smoke was hovering above a moist spot on the floor that might or might not have been Junior.

"No, no—don't," Papenek shouted, squirming and writhing under Elsie's merciless assault. "He'll come back. I just punished him a little. Do you think I'd extinguish a *child!*"

"He'll *come back?*" Elsie's voice was a shriek. "He'll—"

"Certainly. I just stepped up the beam a bit. Right now his body has the same refractive index as the air about him, but he'll waver back in about five . . . why, she seems to have fainted!"

Five minutes later Shevlin stood with his arm about his wife's sagging shoulders, watching his son wavering back.

Not all of Junior came back immediately. First his face materialized, pale and startled, and then the back of his head, and then his small body, and finally his feet. His feet took their time in coming back.

"I just didn't realize what a shock it would be to you," Papenek said. "You Atomic Age primitives had abnormally developed parental instincts. When *we lose* children we certainly don't lose any sleep over it. We—"

Something in Shevlin's stare caused him to break off abruptly.

Miraculously Junior didn't seem to be any the worse for his experience. Though the punishment had surpassed a sound spanking in severity there was nothing to indicate that it had left a lasting impression on his mind.

As though to prove that it hadn't he bent over and stuck out his tongue at Papenek the instant he was himself again.

The little man seemed to reach a decision then. He moved closer to Shevlin and said, very quietly: "Perhaps you'd better take your children upstairs and put them to bed—or wherever you put them when you want to discuss serious matters in a quiet way."

"I'll take them up," Elsie said, just as quietly. "Stay here and talk to him, dear. Find out just how long he intends to stay. Before we make any plans we've got to find out what our chances are of staying alive in this house."

The next fifteen minutes were for Shevlin the most unnerving of all, for the instant Elsie's footsteps died away the little man asked him the sixty-four dollar question.

He'd been afraid all along that Papenek wouldn't believe he knew no more about time travel than the man in the moon. If he told Papenek the truth—

He decided to stake everything on Papenek's capacity for recogniz-

ing the truth when he heard it. He avoided looking at the tube as he made his reckless bid for survival. He kept nothing back, even though it meant sacrificing the niggardly respect which Papenek had for the resourceful primitive he'd pretended to be.

It was a long moment before Papenek spoke.

For the first time the little man seemed visibly shaken, as though the bottom had dropped out of something that had flared with a blinding incandescence for him.

"I've been incredibly blind," he said. "I should have known that the father of such children would be incapable of inventing a time-traveling house."

Shevlin no longer felt angry—only cold. He suddenly realized that he'd put his cards on the table without weighing the advantages

which might have accrued from playing them close to the chest. Not that he'd held a trump hand, exactly, but—

Startlingly Papenek said: "My mind works better on a full stomach. Before we go down in the cellar and have a look at the machinery perhaps we'd better have something to eat. Have you any eggs or fresh meat I could heat up?"

"Eggs?" Shevlin said, dazedly. "You mean you still eat—"

Papenek blinked. "Naturally we still eat. What gave you the idea we could live without food?"

"I . . . I took it for granted vitamin concentrates would be the food of the future. Even in our age—"

"Good earth, no!" Papenek said, impatiently. "It may take me a week—or a month—to learn the correct way of sending the house backwards and forwards in time. If I'm to be your guest I've no intention of foregoing the pleasures of the table."

Shevlin's face looked a little abnormal, as though it were reflecting his thoughts in an illicit way and not at all along the lines laid down by nature.

"You'll occupy the guest room, I suppose?"

"Why not?" Papenek said. "Oh, and while I think of it, I hope you have soft feather beds. If there's anything I detest it's a coarse hair mattress."

Elsie looked down the long table, and pressed her palms to her temples. "He must have had specialized training in eating," she said.

Shevlin followed his wife's stare, wondering how he'd managed to live through the past three days.

Papenek had tucked a paper napkin under his chin, and was busily engaged in sucking his fifth egg. Having cooked the egg by stepping down the tube to its lowest potential, he seemed to consider it his duty to savor its flavor to the utmost.

"There isn't a great deal you can do to help me, Shevlin," he said, looking up. "But you might at least stop whispering to your wife while I'm eating. It upsets my digestion."

Shevlin shut his eyes, ground his teeth together and thought back seventy-two hours.

Papenek climbing into bed, after first bouncing up and down in the middle of the bed to make sure it would sustain his weight. Papenek drawing up the sheets, demanding a heating pad, and telling Elsie to get out.

"Your husband will see that I'm made comfortable. If there's anything I detest it's a woman standing in the doorway wringing her hands while I'm getting into bed. Get out! GET OUT!"

Elsie slamming the door, screaming back through the door: "Roger, there's some chloroform in the medicine cabinet! If you don't come out smelling of chloroform, you can start looking around for another wife!"

Papenek down in the cellar, very wide awake, bending over the machinery.

Hour after hour after hour. His

lean and competent little hands working feverishly away in the glow which came from the tube as he stepped it up and down at ten-second intervals. Papenek using both his hands and the beam, turning occasionally to nod at Shevlin, gloating over his progress and making statements which filled Shevlin with steadily mounting dread.

Papenek saying: "Of course we'll go back immediately to your age and find the man and destroy him. If the secret leaked out, you First Atomic Age primitives might construct dozens of time machines and destroy our world completely. You almost destroyed your own world, so how can you be trusted with such knowledge?"

"But when you've found him—" Shevlin shuddered. "When you've done that you'll return to your age?"

"No, I can't promise you that. It may be necessary for us to police your world for a while. In fact, you may be sure we shan't allow anything to exist in the past which could possibly injure us here in the future. Even a minor infection should be cleansed at the source. Otherwise it will spread and fester."

Papenek was smacking his lips now, and rising from the table. "My work is so exacting I need a great deal of food to ward off fatigue," he said. "But you certainly don't need an egg apiece. Next time scramble one and divide it. You want the eggs to last, don't you?"

"If they were filled with cyanide, I'd want them to last," Elsie mumbled under her breath. "I'd even settle for roach poison."

"The little man who came for dinner," Shevlin whispered, "is eating us out of house and home. Perhaps we could sprinkle arsenic on the wall paper."

"Be careful, Shevlin," Papenek warned. "I shouldn't care to *really* step up the beam, but—I must warn you! Remarks like that disturb me because I know you mean them."

Shevlin's features darkened. "All right," he said, loudly. "I'll consider myself warned. Now what?"

"Back to work," Papenek said. "Success is almost within my grasp now, Shevlin. It might even come this morning."

He turned abruptly and went hobbling from the room.

Elsie waited until she heard him descending the cellar stairs before she took her husband's cold hands in her feverish ones and said, anxiously: "Roger, if it should come this morning, are we prepared for it?"

"About as prepared as the dodo was when the early Dutch navigators peppered his hide with a blunderbuss and blasted his nest right out from under him," Shevlin said.

He stood up as he spoke, pulling his hands free and shoving his chair back.

"That all-purpose tube he's toting doesn't merely alter electronic orbits. It controls atomic chain reactions in a way we've never dreamed they could be controlled. You might say it makes monkeys out of atoms."

Elsie nodded. "They'll overrun our age, Roger. They'll regulate, remold everything and everyone.

They'll give us lessons in cooking, eating, mating and—dying. They'll complain, they'll be petulant. They'll be capricious and fretful. Sour little spinsters armed with glowing darning needles they are, male and female. I haven't seen the females, but—"

"We've seen Papenek. He's been our guest."

"Yes, we've seen Papenek."

A moment later Shevlin was descending the cellar stairs. He moved cautiously, because he hoped to surprise Papenek in one of his unguarded moments and perhaps learn just how close to success he really was. Shevlin knew that not too much reliance could be placed on Papenek's words, but Papenek's expression would be a dead give-away if he could be surprised in the very act of making a connection bright with promise.

It wouldn't have to be the final connection. It could be the one before the last or the one before that. What it boiled down to was that if Papenek was about to succeed the mounting tension would show up in his features.

Shevlin was halfway down the stairs when he saw Papenek kneeling in shadows a little to the left of the beam cast by the tube, which was lying on a circular metal stand about twenty feet from the base of the stairs.

Shevlin's breath caught in his throat. It was the first time Papenek had ever turned his back on the tube or allowed it to stray so far from his person.

It was Shevlin's chance, and he knew it.

According to present ideas of motion a moving body can't be in two places at the same time. But almost Shevlin seemed to be crossing the cellar floor while his feet were still clattering on the stairs.

Probably it was simply a case of unbelievably speeded up reflexes. At any rate, he had the tube and was clasping it firmly when Papenek turned.

For perhaps five seconds Papenek's expression remained completely blank. Then, slowly, his mouth tightened and a purplish flush suffused his features.

"Put it down," he said.

Shevlin shook his head. "No. Remember what you said about an infection? It should be cleansed, you said, at the source."

For an instant Shevlin had feared that the tube might be completely smooth, precluding any attempt to step up its energies. But that fear, he now perceived, had been ill-grounded. The part he was clasping was slightly flattened, and he could detect beneath his thumb a double row of tiny protuberances, like musical stops on a child's toy flute.

"I'm afraid you don't realize just what the potential of that tube is," Papenek warned. "It could destroy the earth."

Shevlin was suddenly aware that his knees were shaking. He'd suddenly remembered that the ancients had believed that a flute could go completely bad, piping shrill mysterious music that could bring down

the keystone of matter itself, could topple the very universe into an abyss.

Perhaps it was just thinking about that guess which further unnerved Shevlin, causing him to tighten his clasp on the tube. Or perhaps he'd been exerting too much pressure from the first. At any rate, there was a dull flare, and—total darkness came sweeping across the cellar like a moving wall, obliterating everything in its path.

Then out of the darkness came a voice, filled with utter hate.

"You've inverted the beam, Shevlin. Steady pressure, evenly applied, will do that. I can't see in the dark, but my directional organs will enable me to find you."

There was a sudden, metallic clatter.

"W-what are you doing?" Shevlin asked.

"Looking for a sharp, cutting instrument," Papenek replied, with startling candor. "With all these tools you'd think . . . ah, this will do very nicely. Before I kill you, Shevlin, there's something you may as well know.

"I can send the house back now, to your age or any age. You know that straining blade unit at the base of the central shaft—the one I was reassembling yesterday? Well, you just swing the blade completely around the neutral pole of the magnetic wave arrester and groove it into the third notch from the top. The third notch will carry the house completely back to your age."

Shevlin felt a sudden prickling at the base of his scalp. Under the guise of talking to him Papenek had moved very close to him in the darkness. He could hear the little man's harsh breathing, the shuffling scrape of his unshod feet.

Shevlin clenched his jaw. He'd often wondered just how much self-control he'd have if someone in a *position* to kill him was a murderer by choice or necessity. Now he knew.

He didn't have *any* self-control. But there were forms of fear which could paralyze—

"I've got him, Pop! I'VE GOT HIM!"

The voice tore out of the darkness, exuberant, lusty, springy with confidence. It swelled into a mouthing of syllables that ran together as syllables are prone to do in the mouth of a nine-year-old almost beside himself with the joy of battle.

"I tripped him up, Pop! Pop, quick—turn on the lights!"

Mentally Shevlin poured himself a stiff one, swallowed it and went staggering blindly around the cellar in search of a dangling light bulb that continually seemed to elude his grasp.

He was still making frantic clutches at the air when the entire cellar blazed with light.

For an instant Shevlin thought that he'd collided with the bulb and jarred it on. Then he saw that by some distortion of pressure he'd energized the tube again, causing it to brim with more than its wonted share of light.

Papenek, armed with a very long

and wicked-looking drill, was trying to get up. But Junior was sitting on Papenek's chest, swinging his legs and digging his thumbs into the little man's eye sockets, so remorselessly as almost to justify what Papenek had said about the savagery of children.

"You murderous little savage," Papenek shrieked. "Let me up, you hear? You primitive little—"

"Enough of that!" Shevlin said, clasping the tube very firmly and aiming it at Papenek's bulging brow. "One more word out of you and I'll step up the beam so high you'll be just a little wisp of smoke drifting off into limbo. Perhaps less than that."

Papenek quieted down.

"That's better," Shevlin said.

Very deliberately he unfastened his wrist watch and handed it to his son.

"What goes, Pop?"

Shevlin looked at his son. "Junior, just how long have you been down here?" he asked.

"Since before breakfast, Pop," Junior said. "I've been spying on him ever since he started dismantling that straining blade unit yesterday afternoon. I was hiding in the coal bin, so I didn't miss a thing. Y'know, Pop, there's a make-or-break ignition factor involved that's only partly magnetomotive. A regular manual pinion shift movement it is, Pop."

"Hm-m-m," Shevlin said. "Are you sure you can handle it, Junior. You didn't seem like a prodigy to me when you tripped him three days ago for no reason at all. Not a prodigy born a year after the New Mexico experiment, at any rate."

"Ah, that was just a gag, Pop. Betty Lou dared me. Besides, I wanted him to think that all I had inside my head was an elaborate arrangement of knocking tubes."

Shevlin nodded at Papenek. "Remarkable boy in some respects. I.Q. of 270. It disturbs my wife more than it does me. Maturity will bring emotional balance, and we'll need a few young *mutant* geniuses to handle the difficult tasks ahead. He can see in the dark too. Dark sight is common enough in Eskimos, but before 1945 extremely rare in Caucasoids. It's more effective than directional organs, don't you think?"

Papenek seemed to be having trouble with his face. It kept darkening and whitening in patches, and —his jaw had begun to twitch.

"If the house returns as fast as it came, we should be back in time for lunch," Shevlin said. "Give me five minutes, Junior. Then notch in the thingamajig and let the straining blade . . . aw, shucks, I don't have to tell *you* how to handle a machine. The Los Alamos radiations took care of that."

"Just leave everything to me, Pop. I won't even get grease on my hands."

Shevlin flourished the tube a trifle menacingly.

"Start moving, Papenek," he said.

Up the cellar stairs Papenek stumbled, his face a twitching mask. Down the lower hallway into the

living room, and then out through the living room to the front porch. The permeable patch was just wide enough to enable Shevlin to pass through in Papenek's wake. He had to stoop a little, but he didn't mind because he knew that another ten seconds would see the last of Papenek.

Out on the porch he spoke sharply. "All right, jump!" he ordered. "Get on with you! Right out into the mist, little man!"

Papenek jumped from the porch.

Shevlin waited until he'd disappeared in the mist before he turned and went striding back into the house.

It was curious, but he'd grown quite fond of the house just in the last fifteen minutes. No—it went back further than that. The house, too, had gone through a lot, and like a faithful old collie dog that has shared a man's trials and tribulations—

He was suddenly aware that Elsie was standing in the living room door, her face distraught.

"Roger, I've searched everywhere for Junior," she said. "Do you suppose—"

Shevlin smiled and crossed to her side in three long strides.

"Don't worry," he said, kissing her. "Junior's at the helm and everything's under control. In just about five seconds now—"

There was a sudden, dazzling flash of light.

THE END.

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We Kill People

by LEWIS PADGETT

It was quite a business, too . . . and it wasn't anything you could prove murder. Murder, after all, is strictly a human affair; this was, on the contrary, an inhuman sort of business!

Illustrated by Kramer

Glowing in polychromatic light, the neat, cryptic sign atop the building said sedately:

WE KILL PEOPLE

In the foyer, the directory told Carmody that the main office was on the second floor. There was nothing else listed on the glass-fronted board. Of the bank of elevators, only one was running, and that one operated by a uniformed moron with sleepy eyes and jaws that monotonously masticated gum. Carmody stepped into the car.

"Second," he said.

The operator didn't answer. The door closed, the floor pressed upward and then decelerated, and the moron slid the door open, to shut it quietly as Carmody stepped out on the deep carpet of a big, well-furnished reception room. One wall was lined with doors, numbered consecutively one to ten. The wall opposite the elevator was blank except for a few framed pictures and a six-by-six screen that showed a blond young man seated at a desk.

"Good morning," the young man said, looking into his telescreen and meeting Carmody's eyes. "May I help you?"

"Yeah. Who do I see about—"

"Oh," the young man said soberly. "Our exterminating service?"

Carmody didn't say anything.

"You *are* a client?"

"I might be. It depends."

"Quite," said the young man. "Our Mr. French will take care of you." He did things with the buttons on his desk. "Yes, he's free now. Would you mind stepping into Office Number One?"

Carmody pointed silently, and the young man nodded. Carmody walked across to the door, pushed it open, stepped through and glanced around, his face impassive. He was in a small room, furnished simply but with good taste. A relaxer chair extended beside a broad, low table that held a minor-size telescreen. The makings for smokes and drinks were conveniently handy.

On the screen was the head and shoulders of someone—our Mr. French, presumably. He had gray-streaked brown hair, a smooth, thinnish face, a sharp nose, and old-fashioned noncontact pince-nez. His clothes—what Carmody could see of them—were conservative. And his voice was dry and precise.

"Will you sit down, please?"

Carmody sat down. He lit a cigarette and looked speculatively at the face on the screen.

"My name is French, Samuel French. You'll notice the receptionist didn't take your name. If you decide to make use of our service, we'll need it, of course, but not just yet. First let me assure you that nothing you may say to me will put you in danger from the law. An intention to commit homicide is not actionable. You are not an accomplice either before or after the fact. Once you understand that, you'll be able to talk to me freely."

"Well—" Carmody said. "I'm a little—hesitant."

"We kill people," French said. "That's what brought you here, isn't it? To get an exterminating job done—safely."

It wasn't what had brought Carmody here, but he couldn't tell French that. He had to submerge himself completely in the role he was playing. From now on, he had to forget that he was working for Blake and play the part of a customer. At least until he had found out a little about this organization.

There had been nothing like it in the Amazonas. But the Amazonas Basin wasn't civilized, even fifteen years after World War II had ended. In the five years of Car-

mody's life there as a construction engineer he had seen little change, really; a dam here, a railroad there, but nothing to touch the rain-forest and the big river and the seasonal floods. Then his discontinuance notice had come through, and, in white-hot fury, he had hopped the first clipper to New York, determined to punch the big shot in the nose.

He hadn't done that. There had been secretive visitors and interviews, a closed air cab that whipped northward, and the vision of an Aladdin's palace that he recognized as Oakhaven, the country estate of Reuben Blake. Even in this day of fabulous fortunes and super-tycoons, Blake was a figure. He represented money and industries—and politics.

Oakhaven was an architect's dream. The new plastics and alloys had made such engineering feats possible—towering columns that sprang sky-high from fragile-seeming, translucent floors, concepts from Rackham and Sime transmuted into hard reality. Carmody, flanked by guards, was passed from chamber to chamber, till he reached the penthouse sanctum of Blake. A battalion could have deployed across the resilient, landscaped floor of that sanctum. And, seated at an oynx table with a chessboard inlaid into the top, a big drunken man was jittering nervously as he laid scraps of paper on the board's squares.

"Carmody," Blake said, looking up. "I'm glad you got here. Have a drink." He pushed glass and bottle forward. Carmody laid his hands flat on the table and glared.

"I want to know why I'm here," he said.

Blake gave him a glance that, surprisingly, held only appeal.

"Please. Please sit down and let me explain. I . . . I had to do some things . . . you'll understand. But first get this. I'll pay you whatever you want. I'll see you get your Brazilian job back, if you want it. I'm not trying to coerce you."

"Why was I fired?"

"I needed you," Blake said simply. "The construction company could get along without you, and I couldn't. I can't. Not very well. Now have a drink, sit down, and give me a chance to explain. Man, I'm sick!"

That was true. Something had hit Blake hard and knocked the tough backbone out of him. Carmody hesitated, sat down, and looked at the chessboard. Each square had a bit of paper on it. The first one said 1¢. The one next to it was marked 2¢. The third, 4¢; the fourth, 8¢. The ultimate figure was astronomical.

"Yeah," Blake said, "you've heard the old gag. A rajah offered his favorite the choice between half his kingdom or—I forget what it was. The favorite said he just wanted a chessboard filled with money, doubled for each successive square. I don't know if the rajah ever paid it. Who could?"

"So what?"

"I've got power. But I need an operative. I'm fighting something that's plenty smart. An organiza-

tion. They've got their ways of checking up, and if they ever suspected you were working for me—well! That's why I couldn't have gone about this more openly. I had to cover up. If you'll do a job for me, you can have anything you want. Literally."

Carmody started to answer, and then paused, his mouth open. Blake gave him a twisted, slack-mouthed grin.

"You're getting it. I *can* give you anything you want—within human limits. I'm Reuben Blake. But I won't be for long, unless I get help."

"I thought you had an organization."

"Sure I do. But this has to be strictly undercover. I picked you out from fifty case records. You're smart, not too scrupulous, you know your way around. You're qualified for the job."

"What's the job?"

"It's a frame," Blake said. "A smart frame. What it boils down to is this: my money or my life. And I've got to hand over one or the other!"

"But—how?"

French adjusted his pince-nez and said, rather wearily, "I should have a record made of this. Our clients are always skeptical at first. Unless they know us by reputation . . . you've *never* heard of us?"

"I just got back from Brazil," Carmody said. "Since then I've heard things, sure. That's why I looked you up. But I can't quite see how you can do it."

"Commit murder?"

"Exactly. The law—"

"We have a foolproof method," French said. "It's absolutely undetectable. Indistinguishable from natural death. The insurance companies are our biggest enemies, but we've a corps of attorneys who watch out for loopholes. We won't go to jail for income tax evasion!"

"You might go to jail for murder though. How about that?"

"Hearsay isn't evidence. You pay us to kill your enemy. He dies—of natural causes. We've had lawsuits, but we've never been convicted. Autopsies proved nothing except that no homicide was committed. You might call this insurance in reverse. Death insurance. If your enemy doesn't die, we refund your money. But we've never had to make a refund yet—except under Clause A."

"What's that?"

"We'll come to it later. First of all, let me apologize for pointing out that we must be assured you're a bona fide client. We have no time for reporters, spies, or curiosity-hunters."

"I'm a *prospective* client," Carmody qualified. "And I want a—job done, yes. Only I don't want to hang for it."

French put the tips of bloodless fingers together. "We have been in business only four years. Our organization is based on a certain scientific . . . ah . . . discovery. Our patent, you might call it. And that, of course, is a secret; if the nature of this patent were known, we'd have nothing to sell."

"The *modus operandi*, you mean?"

French nodded. "Yes. As I say . . . we're expanding. We don't advertise much; we don't want to attract a low-class clientele. And we *are* incorporated; we have an exterminator's license, and we do maintain a service, on the side, to get rid of bedbugs and termites. We don't encourage that sort of thing, but we must do a bit of it for a front. However, our money is made through murder. Our clients pay well."

"How much?"

"No fixed rate. I'll explain *that* later, too."

"There's got to be some minimum, though," Carmody said.

"Why? We went into the whole matter thoroughly, with expert psychologists and criminologists, before we incorporated. Experience proved our theories to be correct. What are the motives for murder?"

Carmody ticked them off on his fingers. "Well, greed—jealousy—revenge—"

"Passion or profit—two classifications, generally. We get few of the former. Such crimes are generally committed during a temporary emotional storm. Give the storm time to die down, put it on a practical level of hard cash, and the passion-murderer usually changes his mind. Moreover, very often he wants the pleasure of committing the crime himself. There *have* been cases, of course. But profit is the main motive. And most of our clients are drawn from the higher income brackets. It's a convenient service we offer, after all. The lower brackets are pretty conservative; they have indoctrinated morals, and think it's worse to pay for murder than to commit it personally."

"While the upper brackets are amoral, eh?"

"It's a case of relative values and proportions. Especially in *this* day and age. Power grows in direct ratio to money; if you have enough power, you approach godhead in your ability to juggle with lives. The gods were notorious for inundations and lightning-bolts. They could destroy mere humans without compunction. But the money barons don't need our help to handle lower-bracket enemies—they've got their own financial weapons for that. It's only when the gods were fighting among themselves that they called in aid. I could tell you cases that would surprise you—but, naturally, I shan't. Now—shall we discuss business?"

"All right," Carmody said. "The guy's name is Dale, Edward Dale."

"Address?"

Carmody gave it.

"Your name?"

"Albert Carmody. Don't you want to know my . . . uh . . . motive?"

"That will be investigated. Most of our running expenses are aimed at covering the initial investigation. As soon as we assure ourselves that you have a sound motive for wanting Dale killed, we'll take action. That's to protect ourselves against spies, framed evidence, and so on.

We'll find out all about you, Mr. Carmody, don't worry about that."

Dale was executive president of the Brazil-U. S.-Combine that had fired Carmody. The motive was O. K.; it would, Carmody knew, check with his own rather violent personality-pattern.

"How much?"

"We set no price. That's up to you."

"Ten thousand dollars."

"I see," French said, making a note. "Now let me explain Clause A. In a business like this, we must set a high standard of honesty and professional ethics. We're bonded with Dow-Smith—the regular honesty bond, by which we forfeit ninety-five percent of our assets if it can be proved that we reneg on a contract. We have a standard of moral ethics, too."

"Moral?" Carmody said, lifting an eyebrow.

"Certainly. We've reduced life-value to a basis of pure cash. Here's how it works. Our investigators will give us an estimate of your total assets. Let's say arbitrarily you're worth a hundred thousand dollars. You'll pay ten thousand to have Edward Dale killed. His life, then, is worth ten percent of your assets. You follow me?"

"So far."

"If Dale's life is worth, to him, ten percent of *his* assets, we'll refund your check."

"I don't get that."

"Dale will be notified that a client has asked for his death. Your name, of course, won't figure in it. Nor will the amount you offered. The percentage *will* be mentioned. If Dale will pay ten percent of his total assets, we'll drop the case and refund your money."

"But how do you know he's got any money?"

"The chances are he's got more than you have, or you wouldn't need our services to exterminate him. It depends on your motive, of course. It's a risk we run. But we average. We average."

"It sounds like blackmail to me," Carmody said. "If I pay you to kill Dale, and you take protection money from him—"

"Two things are sure, death and taxes. The moment we accept your patronage, Dale is *in articulo mortis*. We are in the position of a physician who can save his patient's life—and charges for that medical service."

"After he's first administered poison."

"We have our ethics," French said, spreading his hands, and glacing interestedly at the well-manicured nails. "We put a cash value on a man's life, that's all. And a life isn't as intangible as . . . say . . . a lease."

"That's a question. Anyhow—let me think this out. You'll take my check for ten grand to kill Dale. But if he pays you—ten percent—of his assets, then he survives."

"And your money is refunded, under Clause A."

"What's to prevent me from coming back a week later and offering twenty thousand to get Dale killed? I could ruin the man that way. He'd have to keep on paying and paying till—"

"Ethics. We never accept the same client aiming at the same objective twice. That's a rule. You might come back and hire us to kill somebody else—that'd be acceptable—or anybody else might come in and pay us to kill Edward Dale, but we'd never accept another commission from you to murder Dale."

"But there's nothing to stop me from giving dough to some friend and having him hire you to kill Dale."

"Not a thing. Except our corps of investigators. They'd find out where that money came from. And if the client had a real motive for wanting Dale killed. It would look fishy. And we wouldn't take the case."

"I see," Carmody said, and a faint grin crossed his face. He was thinking of Dale's reaction. Dale would pay; the man was familiar

with the way WE KILL PEOPLE worked, Carmody knew, and would certainly pony up ten percent of his sufficiently large fortune to save his own life. Carmody had surreptitiously assured himself of that already. He himself had killed in the past, but never quite in cold blood. He didn't want Dale dead, no. But the man had been guilty of double-dealing. He had taken Reuben Blake's orders, and fired Carmody from a job he liked and wanted. So Dale would have to pay for that. Not with his life, but with ten percent of his assets—which would total a lot more than ten thousand dollars!

No. Ten percent had been the arbitrary figure set by French. The figure would be closer to five than ten—still large enough to hurt, though. And Carmody's bankroll was no windfall. He had earned it, and no investigation could shake that fact. That financial asset had been one of the reasons Blake had chosen Carmody—

"—to help me," Blake had said, back in his palace penthouse, two weeks ago, while he stared at the chessboard before him. "You've got to, Carmody. Or I'll be ruined."

"A firm like that—" Carmody said thoughtfully. "WE KILL PEOPLE. Why isn't it stopped?"

"I told you why. I've explained. But now—well, all I can do is find out *how* they kill people. I can't move economically against them; their weapon is murder, and it's absolutely sure-fire. They've built up a reputation in four years."

"Without proof?"

"Without *legal* proof. Listen. Kalman, the oil man, told me he'd been approached. Fifteen percent of his assets—they knew exactly how much that'd be, too—or he'd be killed. He told them to go to hell. He got legal aid and police protection. Fortnight later, polio killed him."

"Polio?"

"Yes. Seth Berger—septicemia. Miller—atypical pneumonia. Bronson—rheumatic fever; Jaeckle—cerebrospinal meningitis."

"Lately?"

"Of course not," Blake said, pouring himself a drink. "Most of those were three years ago, at least. Jaeckle died last year, but he had delusions of grandeur. He was guarded day and night. Thought he could escape. Result, meningitis."

"How?"

"Nobody knows. WE KILL PEOPLE didn't send out a man to stick a hypodermic needle into the guy, if that's what you mean. They have some absolutely sure method of committing murder so it looks like death from natural causes."

"Had Jaeckle been exposed to meningitis?"

"How can you answer a thing like that? Maybe, maybe not. And listen, Carmody—people get over meningitis, and pneumonia, and rheumatic fever. But not Jaeckle or Bronson or Miller. With WE KILL PEOPLE, the mortality rate is one hundred percent. Forget about precautions. They won't work. If WE KILL PEOPLE

puts the bee on a man, he's *dead!* No, what I want to find out is how it works. What their trade secret is. Once I know that, I can move. Not necessarily legally, but effectively. I have a good organization, as you've found out."

"I've found out, all right," Carmody said, and Blake swallowed his drink hastily, spilling some of it down his chin. He dabbed ineffectually at his foulard.

"O. K., I've apologized! I told you I'd give you anything you wanted!"

"And you can do it. That's why I'm saying yes. But I need more information. Are you afraid to die?"

Blake sighed, put down his glass, and stared at nothing. "Sure. And I'm afraid of waste. I'm a white rat going crazy in a maze. My plans aren't finished by a long shot. I know my average life expectancy, and I've enough doctors in my pay to keep me healthy—unless I'm murdered. But I don't want to be poor. I'd rather be dead."

"What do WE KILL PEOPLE want? A hundred percent of your dough?"

"It was a frame-up," Blake said. "A very neat, logical frame. I told you how WE KILL PEOPLE works. They're ethical, in their way. But these twenty men—more or less, I don't know how many there are, and that's what's helping to drive me nuts!"

"What about them?"

"Enemies of mine. I've enemies, of course. I suppose they hate me, and I suppose they've got justification. I've probably ruined a lot of 'em in various ways. I don't apologize for that. I can't hunt up everybody who's suffered by my policies and apologize personally—or pay them off. There are too many. And I don't know who all of them are. I open a plastic factory, and an employee of copper somewhere in Burma gets fired, goes hungry, his family starve—he hates me. Do I know anything about it? No."

"So you've got a lot of enemies. What are they doing?"

"Ruining me," Blake said. "They aren't rich, I'm sure. I'm one of the wealthiest men in the world, and there aren't many in my class. No, these are middle-income figures. Call 'em A, B, C, and so on. A is worth practically nothing. No assets to speak of. B has a little more but not much. C has a little more than that. I've figured it out, Carmody, and it makes sense."

"Well?"

"These —enemies—got together and figured out an idea. A cumulative method of ruining me. A went in to WE KILL PEOPLE and offered 'em one percent of his assets if they'd kill me. Fine. WE KILL PEOPLE got in touch with me and told me about it. I paid—one percent of my total holdings. Leaving me ninety-nine percent."

"Oh-oh," Carmody said. You mean—"

"Then B called on WE KILL PEOPLE and paid 'em two percent of his assets. He could afford that; he had a little more dough than A. WE KILL PEOPLE asked me for

two percent of my assets *at that date*—that is, after one percent had been deducted from the total. I paid. A week later, I was called on to pay three percent. After that, four percent of what I had left. D'you see?"

"But . . . uh . . . huh. That means the percentage will keep going up as your assets go down."

Blake seized a stylus and figured rapidly on a pad. "I know this by heart. Let's say my total assets, originally, were represented by the arbitrary sum of one hundred dollars. Here's the breakdown, so far."

The figures looked like this:

1% of	$100.00	$99.00
2% of	99.00	97.02
3% of	97.02	94.11
4% of	94.11	90.35
5% of	90.35	85.83
6% of	85.83	80.68
7% of	80.68	75.03
8% of	75.03	69.03

"Multiply that by billions and you've got it," Blake said. "A lot of my assets are tied up or frozen. I can't keep jerking out cash without upsetting the apple cart. Can you think of a better way to drive a guy nuts? I don't know how long this will keep up, you see. When I'll get a call for nine percent—and after that, ten and eleven and *hell!*"

"At the rate of pay you offer," Carmody said, "I'd be a fool if I didn't take the job. However! I'm just one man—"

"All the data we've gathered will be placed at your service. I've a staff of military and strategic experts, you know. And technicians. We've a few gadgets that'll help you. You'll be well equipped for offense and defense. But in the end it'll depend on you personally. I want to know how these—murders! —are committed. After that—"

"—after that, you'll be notified," French said. "You understand that our investigations come first. Then we accept or reject your case. Finally, we'll give Dale a chance to meet your figure. If he does, of course—he lives."

Carmody took out his checkbook, but French lifted a restraining hand. "That's not necessary yet."

"All right. There's one more thing, though."

"What?"

"I'm looking for employment."

French seemed surprised. "A job?"

"A job. I was fired from a good one by some sort of wire-pulling. I've enough dough to settle down, and I could get another job easily. But ordinary work won't suit me. I want something interesting. Now that I know a little about your setup, I'm intrigued. Plenty."

"Well," French said, "I don't know. It isn't often we get a client and an applicant for work at the same time."

"I'm an unusual guy. And my qualifications are good—I think. At least, for your line of business. My record will show that."

"You'll have to see Mr. Higgins," French said. "He's the president of the firm. Naturally, personal interviews are pretty important—and so are references."

"You'll save money," Carmody suggested. "You'll be investigating me anyway in connection with Dale, so—"

"Mr. Higgins handles all that," French repeated. "He sees all applicants. It has nothing to do with me, you know. The board of directors is in charge of organizational work; WE KILL PEOPLE is a group of separate units—financial, investigatory, operative, and so on—each one fairly independent. But if you want to see Mr. Higgins, I'll arrange an appointment."

"Will you do that?"

"Of course. You understand, some precautions must be taken—eh?"

"I can see that."

"Very well," French said, smiling for the first time. "You'll be notified, then. Any questions? Well, if not—thank you for giving us your custom, and good afternoon, Mr. Carmody."

He politely stayed on the screen till Carmody went out of the office.

Carmody didn't report to Reuben Blake. It wouldn't have been safe. The strategic campaign had been settled a week ago, and the supply line was open whenever Carmody needed material. From now on, the spies of WE KILL PEOPLE might be watching him any time, so his life must be above suspicion. Blake could hold out for a while; the important move now was to gain entrance to the sanctorum of the homicide corporation. Certain of the gadgets Carmody had available would be useful; there was a microscopic wireless microphone-scanner to be planted in the right place, and there were other interesting devices. Meanwhile, he put the whole matter out of his mind and began living the life of a repatriate from South America—which mostly involved entertainment.

After two days French called him on his hotel telaudio. It was a playback, for Carmody had been out when French put through the call, so it was a monologue rather than a conversation, though, as usual, the automatic questioner, originally dictated by Carmody, had been left audible for convenience.

"Mr. Carmody, please."

"He'll be back at noon. Automatic speaking. Who is calling?"

"Samuel French."

"Any message?"

"Yes. The request for an interview has been granted. At two p. m. a blue-and-white copter will sit at Empire Roofport. That's the one."

"Thank you. Good-by."

Empire Roofport towered above all the other buildings in the city. It was enormous; it had to be, to accommodate the downblasts of the copters. Slightly before two, a cold, drizzling rain was falling, and Carmody stepped out of the automatic elevator to find the roof field deserted, except for an overcoated figure hunched uncomfortably under the transparent awning, staring over the guard rail at the street, a good half-mile down. No copters

were visible. The man at the rail turned a familiar face.

"Lousy weather," he said, and then, "Oh! It's you, eh?"

"It's me. What are you doing here?"

Edward Dale looked uncomfortable. "Waiting for my copter. That chauffeur'll tell me the storm held him up over Long Island."

Carmody wondered if it would be a blue-and-white copter. Dale, of all people! It was impossible. Dale couldn't be president of WE KILL PEOPLE!

"How are you doing?" Dale asked, after a time.

"O. K. I still don't know exactly why you're *here*."

"I work here," Dale said, pointing down, and Carmody remembered one of the Brazil-U.S.-Combine's offices was at Empire.

"You didn't . . . ah . . . expect to meet me?"

Dale frankly stared. "Why, no, Carmody. Why should I? Did . . . you expect to see me?"

"No," Carmody said, and Dale, after a puzzled moment, turned to glance over the rail.

"I told him two, distinctly. Well, I'm going to wait five more minutes and then get a cab."

Carmody watched Dale, while a puzzled frown grew between his eyes. The drizzle grew to a downpour. Finally Dale hunched his shoulders, scowled, and turned back to the elevators. "I won't wait," he said. "I'll put in a call for an air cab at the booth. See you, Carmody."

"Yeah," Carmody said, still scowling. He glanced at his watch, 2:08.

At 2:11 a blue-and-white copter dropped from the low ceiling, and its door opened. Carmody ran through the rain and sprang aboard, pulling the door shut behind him. Instantly sight and sound of the outer world were cut off.

"Rotten weather," a hoarse voice said. "Let's get to a warmer place, what do you say?"

"You're Mr. Higgins?"

The fattish man at the controls spun his chair to face Carmody. "That's right. Come up here and sit beside me, will you?" He indicated a seat at his right. "Wait'll I lift this windmill. Then we can talk."

Seated, Carmody surreptitiously examined Higgins. He couldn't make out much; the man was bundled up in overcoat and scarf, and his shapeless hands, moving deftly over the controls, were cased in heavy thermal gloves. He wore no hat, though, and his bald head gleamed in the light. He had a round, undistinguished face, a button of a nose, and a mouth that was far too small between those bulging cheeks.

"There," Higgins said, settling back at last. "She's automatic now."

"Our destination's a secret?" Carmody asked, nodding toward the opaqued windows.

"What? Oh, maybe, maybe. Anyway, there's nothing much to look at in this weather, and the rain's not very cheerful. Now, Mr. Carmody, to business!"

Carmody decided that the plane

was beginning to travel fast. Already he could feel violent acceleration, though, in the padded seat, it wasn't uncomfortable.

"I didn't expect a personal interview," he said.

"I interview all applicants for positions," Higgins smiled. "However, before we get on to that—there's another matter. This man Dale. It's O. K. We've checked. We'll accept your retainer to kill him. You understand that if he matches your percentage, your money will be refunded, and—no hard feelings?"

"I understand."

"Good. All right, the job. What did you have in mind?"

"I don't know what's available. Not office work, though. I want something that'll keep me interested."

"Uh-huh," Higgins said. He touched a stud. "Too cold here. Take your coat off if you want." He awkwardly struggled out of his own overcoat, pulled the scarf from around his fat neck, and removed his gloves. In a few minutes the copter's cabin was comfortably warm.

"Well," Higgins said, "we've got several branches. There's plenty of paper work. Then we've got our investigatory corps, and our operative group. But the latter is rather specialized."

"I can see how it would be. And I wouldn't expect to get in on that right away—or without thorough investigation. For all you know, I might be in the pay of an insurance company."

"Those insurance companies," Higgins sighed, clicking his tongue. "We have trouble with them. But WE KILL PEOPLE is safe as

houses, Mr. Carmody. We protect our staff. You might qualify for investigation, but never for operation."

The acceleration increased. It was slightly incredible, Carmody decided.

"No?"

"I'm afraid not," Higgins said. "In the very nature of things—well, if you want to work for us, I suppose there's no harm in telling you a little. But you understand you musn't ever repeat this to a living soul."

Carmody turned his head to stare, but apparently the president was quite serious.

"Oh, we take precautions," Higgins said. "Our secret hasn't leaked out yet, has it? I don't know what would happen if it *did*, because our method can't be duplicated artificially. It's . . . well, it's *natural*. All our victims die of natural causes."

"Oh?" Carmody said, beginning to frown again.

"Now this isn't to be repeated," Higgins said chattily, but I suppose you know that everybody's got bugs in him—germs, viruses, and so on? Even the healthiest man contains the seeds of death. Strep, typhoid, tuberculosis, cancer—all sorts of bugs. But usually in such small quantity that the phagocytes can handle 'em. It's only when the bugs multiply that you run into trouble, and have a prognosis of active polio—or whatever. Well, we just multiply the bugs."

"If you're telling me the truth—" Carmody said.

"It's in confidence. We've got a method of multiplying the bugs, that's all. Ever heard of symbiosis? Give-and-take relationship of two organisms? That's the answer. A virus, let's call it x-virus, that sets up a symbiotic housekeeping business—selectivity. Introduced into the human blood stream, it picks out the strongest bug and proposes. It's a smart little virus. If the polio bug is strongest in your system at the time, it goes into symbiosis with polio. It's stimulative. And very adaptable. Result: the polio bug multiplies fast, plenty fast—though not so fast it seems abnormal. Atypical, maybe, but not abnormal. If the polio's cured, the x-virus is still present in the blood stream, and it looks around for the next-strongest bug. Meningitis, or t. b. Anything available, so long as it's malignant. The human organism can't stand one attack after another—polio, meningitis, t. b., cancer—right down the list. Death is certain. I'm not much good at explaining all this, I'm afraid. I'm an organizer, not a technician. But perhaps you see the angles?"

"I see 'em," Carmody said. "It's death from natural causes, all right."

Higgins nodded and chuckled. "Sure. The only trouble is how to administer the x-virus to a victim. That's where our operatives come in. They're pretty specialized. In fact, you have to be born to the job."

"They sound like radio-controlled anopheles," Carmody said.

"No, they're men—but they're mutants. We had to put 'em on the Board of Directors, for one reason or another. They're the ones who started WE KILL PEOPLE. They're a true mutation. Not many of them, so far, but there'll be more. Unfortunately they can't intermarry with humans, only among themselves. So—" He spread his pudgy hands.

"Mutants," Carmody murmured. His throat felt tight.

"The x-virus is natural to them," Higgins explained. "Perfectly normal in their blood stream, part of the check-and-balance system of their rather screwy metabolic set-up. Introduced into a merely human circulatory pipe line, it's fatal. Nothing too startling about that. Some types of blood are plenty dangerous in combination with other types; they don't mix. Natural selection is behind it, but we can't read Mother Nature's mind. The first true humans were mutants, and were given intelligence so they could dominate. They already had agility. Our x-virus boys already had inherited intellect, and maybe this new virus is *their* method of domination. It isn't too foresighted on Mother Nature's part, though. Humans would kill the mutants if they knew. They're typhoid Marys."

"I don't see how they survived infancy," Carmody said.

Maturation takes time. A baby's blood will mix with any other type, you know. Later on it acquires its own distinctive typing. It was like that. Our mutants *were* perfectly normal till they matured. It was only after that that the x-virus developed. But you can see the dangers! They couldn't live in contact with humans without arousing suspicion and eventual real trouble. And they're not super-minds. Some of 'em are excellent technicians, but no better than human technicians. Perhaps intellect may become as vestigial as agility, a convenient secondary trait. In the future, in a mutant world, a few may specialize in intellect, just as we have athletes today. I don't know what the main line will be; the x-virus isn't enough. Instinct, possibly. However, if the mutants are to survive at all, they've got to stay under cover. And because they're not super-minds, they had to make a living."

"Oh," Carmody said, uneasiness crawling down between his shoulder blades. Higgins was talking too much and too plainly.

"Which they did. They've got a private world of their own, adjusted to their mutant needs. A small Utopia. It's underground, in a wilderness country, and I don't think humans can locate it. It's a lovely place. And it also costs a lot to maintain. Thus—WE KILL PEOPLE. The mutants had to find a profitable enterprise which would suit their specialized talents, and that was it."

That was it. It explained the basic amorality of WE KILL PEOPLE's theory and practice, too. The Board of Directors didn't kill fellow-humans; they killed members of

a lower species. Mankind was playing into the hands of the mutants; no such murderous organization could have flourished among beasts. Beasts did their own killing.

They—

Carmody felt a sudden, unexpected sting of pain that instantly dulled and was gone. A roaring grew in his ears. He heard it stutter and die, and he was looking at the copter from fifty feet away, across an expanse of blindingly brilliant white sand. Behind him was a monotonous boom and thunder.

He was sitting up, his back against something—a rough-boled tree.

Higgins was visible through the open door of the copter, his chair swiveled so he faced Carmody.

"You've been unconscious for a few hours," Higgins said, his voice raised slightly. "I used an instantaneous anaesthetic."

Carmody drew his legs under him. There were no after-effects. He felt fine.

"Don't do it," Higgins said. "I can take off in a second, and I want to talk to you first. We thought you were a spy, you know, but we weren't sure. Not many people ask us for jobs. We tested you."

Carmody reached into a pocket. His gun was gone.

Higgins blinked against the glare. "Your psychology checked. You were the sort of man who'd want to kill Dale because he fired you. But you're also strongly acquisitive. Not miserly, but you want value received. The scene on the Empire Roofport was a frame-up. We maneuvered you—and Dale—into a position where you were both alone up there, and there were no spectators to bring evidence if you'd killed Dale personally. You had the chance. You could have thrown him over the railing, taken the elevator down—it's automatic, you know—and you'd have accomplished your purpose quite safely. And you wouldn't have had to pay us ten thousand dollars. But the idea never occurred to you. We were sure after that."

"What are you going to do to me?" Carmody asked. A muscle was twitching at the corner of his mouth.

"Nothing," Higgins said. "This

island is off the air-trade routes. Once in six months a plane visits it, to re-establish boundary lines in the oceanic area. You have slightly more than four months to wait."

"Then I'll be picked up?"

Higgins shook his head. "You'll be buried, that's all. I'm a mutant, too. You have the x-virus in your bloodstream now. We discourage spies, Mr. Carmody." He shrugged and sighed. "I've left you plenty of supplies, so you won't be hungry. We've used this island before, you see. Well, good-by."

"Wait a minute," Carmody said, getting ready. "One more thing. How did you infect me?"

Higgins merely smiled, glanced at his hands—he had donned his gloves again—and swung the seat around. Carmody got a sprinter's start. He plunged for the copter as the engine roared.

He would have made it except for one thing—the downblast. That vertical cyclone knocked him flat. By the time he had scrambled upright, the copter was far out of reach, and heading east. Carmody stood looking after it till it diminished into a speck.

Then he looked at nearer objects. White surf flung its combers over a barrier reef; beyond that, blue sea stretched to meet a cloudless blue sky. Behind him, palmettos and sparse jungle made cool shadows. A stream ran softly out of the forest to meet the sea.

At the foot of the tree where he had wakened was a waterproofed box. Carmody opened it. There was food, plenty of it, and a good variety. He wouldn't starve.

He rolled up his sleeve and examined his arm for the prick of a hypodermic needle, but he found nothing. He remembered the slight sting he had felt in the copter, but that had been merely the anaesthetic. He remembered Higgins' gloves, and grimaced.

The x-virus — symbiotic? It would combine with the strongest bug in his bloodstream, and—

But what bug?

Carmody stood above the box, scowling and staring down. He was checking back, remembering what had killed his parents, his grandparents, his great-grandparents. Had he any hereditary predilection for any particular germ or virus disease?

WE KILL PEOPLE had checked his history; they might know. But Higgins hadn't said. Something at the bottom of the waterproofed box caught his attention, a small metal case. He weighed it in his hand, hesitated, and opened it.

It held sterilizing equipment, a hypodermic syringe with a dozen fine needles, and a supply of morphine. Carmody's lips moved silently. He stood there motionless, the pounding of the surf rising to a crescendo of thunder, the prison of sea and sky clamping down rather horribly.

Morphine. To kill pain.

THE END.

Unpredictable

by JACK WILLIAMSON

***Part Two** of an article on what we do* not *know about weather—and why we can't do anything about it. For ten thousand years or so Man's vessels, like that schooner above, have been wrecked by storms. Now his planes fall victim. We can't control—but we may, someday, predict!*

Even for primitive man, forecasting the return of day and night was probably never much of a problem, although the full scientific explanation had to wait for Copernicus, Kepler, and Newton.

Foretelling the years, however must have caused a lot of grief. Reputations were, no doubt, made or lost on the prompt return of the seasons, and it seems that a good deal of sacrificial blood was spilled in efforts to make sure that spring would come again.

In his great work, "The Golden Bough," Frazer devotes several chapters to the fire-ceremonies of early peoples. He reviews the solar theory of Wilhelm Mannhardt—that the purpose of these frequently rather grim proceedings was to rekindle the fire of the sun, by sympathetic magic, so as to insure the passing of winter, the rebirth of vegetation, and the renewed fertility of the soil and of women.

That seems plausible, although Frazer himself prefers the purification theory of Westermarck—that the fires were intended to destroy witches and such-like evil beings. The two views are not really contradictory, however, as Frazer says: both may be partly true.

The Beltane fires are a typical example of these fire rites. As still practiced in the central Highlands of Scotland in the eighteenth century, they were a feeble but significant reflection of the rituals of the Druids in the dark forests of all prehistoric Europe. Beltane means fire of Bel or Baal, as a footnote in "The Golden Bough" suggests, and Baal in Gaelic means ball or globe; probably the ceremony was originally a solar rite.

The time of the Beltane fires was May 1st. The fire was kindled in a sacred spot on a hill. A sacramental cake was baked, and the blindfolded worshipers took pieces of it. The luckless one who drew a blackened piece became the Beltane carline. In the eighteenth century the burning of the carline was merely symbolic, but in earlier times he wasn't so fortunate.

The Eye of a Hurricane—something that had never before been photographed. Warplanes capable of climbing above even the violence of a hurricane, sturdy and enduring enough to get down again safely, made this picture possible.
Wide World Photos

The Coast Guard service during the war maintained floating meteorological stations at sea. Aboard the Coast Guard Cutter Duane, *weather bureau men prepare to release a sounding balloon to get upper air data.*

Wide World Photos

Similar fire ceremonies held a significant place in the primitive beliefs of much of the world. They were held at various times of the year—May 1st and Halloween, at the vernal equinox, and the summer and winter solstices.

Our own Christmas appears to show vestiges of such winter solstice rites, and even in the beauty of our Easter observances there is still a faint reflection of the old custom of human sacrifice.

For thousands of years before the Christian era, men in the forecasting profession must have been privately compiling calendars to enable them to identify the solstice and so predict the coming spring, and publicly lighting fires—preferably with people in them—to compel the sun to move north again.

The early churchmen found it difficult to eradicate customs fixed by some long generations of usage. They solved the problem with a neat realism, by appropriating many of the pagan forms that they could

not destroy.

The official birthday of Christ was changed from January 6th to December 25th, the approximate date of the solstice. The Yule log of tradition is actually the fire that once was lit to rekindle the waning sun, and through sympathetic magic to warm the world again.

The Christmas mistletoe is a link to the slain god, Balder. It was Balder's death, in the Norse mythology, by a sprig of that enigmatic plant which grows between earth and heaven, that brought the first winter.

For early man, in his first groping efforts to explain the world, seems often to have associated the mystery of the seasons, the death and return of vegetation, with the killing and resurrection of a god. The gods Adonis and Attis were such nature-symbols, and even the Egyptian Osiris.

The Easter celebration of Christ's resurrection, as Frazer states, somewhat resembles the rites of Attis. He mentions a bitter controversy, discussed in the works of Augustine, between the old churchmen and the pagan followers of Attis—when each sect was accused of copying the other's rites. The pagans advanced the somewhat plausible point that their ceremonies were hundreds of years older. Admitting that, the churchmen were still undefeated. Appearance of the copy hundreds of years ahead of the original was merely a clever bit of Satanic duplicity, intended to lead men astray. The devil, in other words, had a time machine!

Eventually, of course, from such dark and bloody beginnings, the problem of forecasting the years was solved. From the secret records of the priesthood there came calendars, and finally the science of astronomy. Instead of the god who was murdered in his human incarnation, to be resurrected with the spring, we now have the burgeoning science of physical climatology.

Weather forecasting was the next great problem for the seers. It is now about where season-forecasting stood at the dawn of history—just emerging from the spells and manipulations of the medicine men, into the light of scientific understanding. Present methods are not quite so good for forecasting tomorrow's weather as the unmodified lunar calendar is for forecasting next spring.

The modern weather man, in fact, has a good deal in common with the tribal witch doctor. They both pretend to superior knowledge. They both engage in rites that mystify the layman—the shaman with his fire and blood and drums, the forecaster with his balloons and teletypes and weirdly colored marks on maps and charts.

The forecaster, as well as the medicine man, requires a confident address and a keen insight into his customer's psychology, as well as a quick anticipation of the future. And the weather man, following the fine old tradition of the Delphian oracle, has a constant tendency to cast his predictions in general or

When a full-fledged tropical storm strikes, it unleashes more energy than did the explosion of the first atomic bomb. It's less devastating only because it lasts longer.

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ambiguous terms, so as to cover as many different outcomes as possible.

There is a curious likeness between the forecaster coloring the precipitation areas on his prognostic charts, where he thinks it will rain tomorrow, and the witch doctor burning a small doll made to represent a man who will probably die tomorrow. Unfortunately for the forecaster, however, the elements are not so responsive to suggestion as the frightened savage.

Such magical efforts to control as well as forecast the future are falling into disrepute, but the idea survives in the common joke about the weather man making the weather. When the arid western states are drought-stricken, public prayers for rain are offered, and sometimes an ambitious modern rain-maker will try burning mysterious chemicals in a tower—maybe it will rain, anyhow, and what has he got to lose?

The first part of this article discussed the present state of weather science and the fine art of weather prediction. Now, forecaster-wise, we shall take a speculative glance at the future.

Will the Weather Bureau ever be able to publish a thick annual volume, with some such title as this: "World Weather and Climate Ephemeris for 1999, with Hourly Temperatures, Dew Points, Ceiling Heights, Visibilities, and Precipitation for Eighty Selected Stations, with Auxiliary Charts Showing Winds Aloft, Cloud Cover, Hazards

to Flying, and the Paths of Tornadoes and Hurricanes"?

That is a desirable goal. Any sort of long-term planning, by men or nations, is apt to be upset by unexpected quirks of the climate. A slight temporary change in the general atmospheric circulation can shatter the lives and fortunes of millions, in a Dust Bowl, or overwhelm cities with a hurricane off the usual track.

The difficulties yet to be solved by the climate forecaster, however, are considerable. It will probably be some time before the Glacial Epoch Warning Service can operate with scientific certainty.

The Earth's climate, from the evidence of geology, ranges between two typical extremes. In the normal type of era, the oceans are relatively large in extent, the continents are low with the mountain systems well eroded, the air is warm and humid, and there are no polar ice caps. The entire planet, the most of the time, enjoys a mild and genial climate.

The abnormal type is the glacial epoch. During the ice ages, the continents have been relatively great in extent, the mountains new and high. New land masses restrict the free circulation of the oceans. Volcanoes probably are active, as the mountains rise. There are immense ice caps, with a harsh climatic contrast between desert and glacier. The Earth, in these brief but catastrophic periods, is far colder.

Between those two extremes, there is a continual and irregular change in the world's weather. For the prevailing weather, which is climate, depends on an infinite variety of factors. The perfect forecast will have to take account of them all.

Some of these factors are obvious and fairly well known—the amount of the sun's radiation, for example, or the motion of the Earth. But others, as various as a new iceberg cracking off the Antarctic cap, a lumberjack felling a tree in Siberia, or an undersea volcano erupting into the path of the Kuro Shio, are too minute, numerous and obscure ever to be fully observed and analyzed.

Since the atmospheric engine runs on solar power, the logical point at which to begin a brief discussion of these changing factors that go into the final integration of the weather, is with the sun itself. The star of day may appear as changeless and dependable as time. But it isn't.

The sun is a variable star.

The patient observations of Dr. C. G. Abbot and others show that the solar "constant"—which is the value of the sun's radiation reaching the outer limits of the Earth's atmosphere—is as much as two percent greater at the time of sunspot maxima than at spot minima.

By pyrheliometer measurements of the solar constant for many years, and analysis of the irregular-seeming curve, Abbot has found evidence of twelve or more periodic changes in the sun's radiation, imposed one on the other, all integral submultiples of twenty-three years.

There is good evidence for a forty-six-year cycle in average rain-

fall—a period, oddly, just double the sunspot cycle. That cycle is shown by records of the annual Nile floods extending back to 622 A. D., by studies of tree rings, and even by the different thicknesses of the layers of sediment laid down by yearly floods back in the Pleistocene.

Pettit of Mount Wilson has measured the ratio of visible to invisible light in the sun's spectrum, by an interesting method. He used a film of pure gold thin enough to be translucent to filter the visible light, obtaining a narrow band of green, and a pure silver film to filter the ultraviolet. His results show a fifty percent variation in the ultraviolet radiation, during the sunspot cycle.

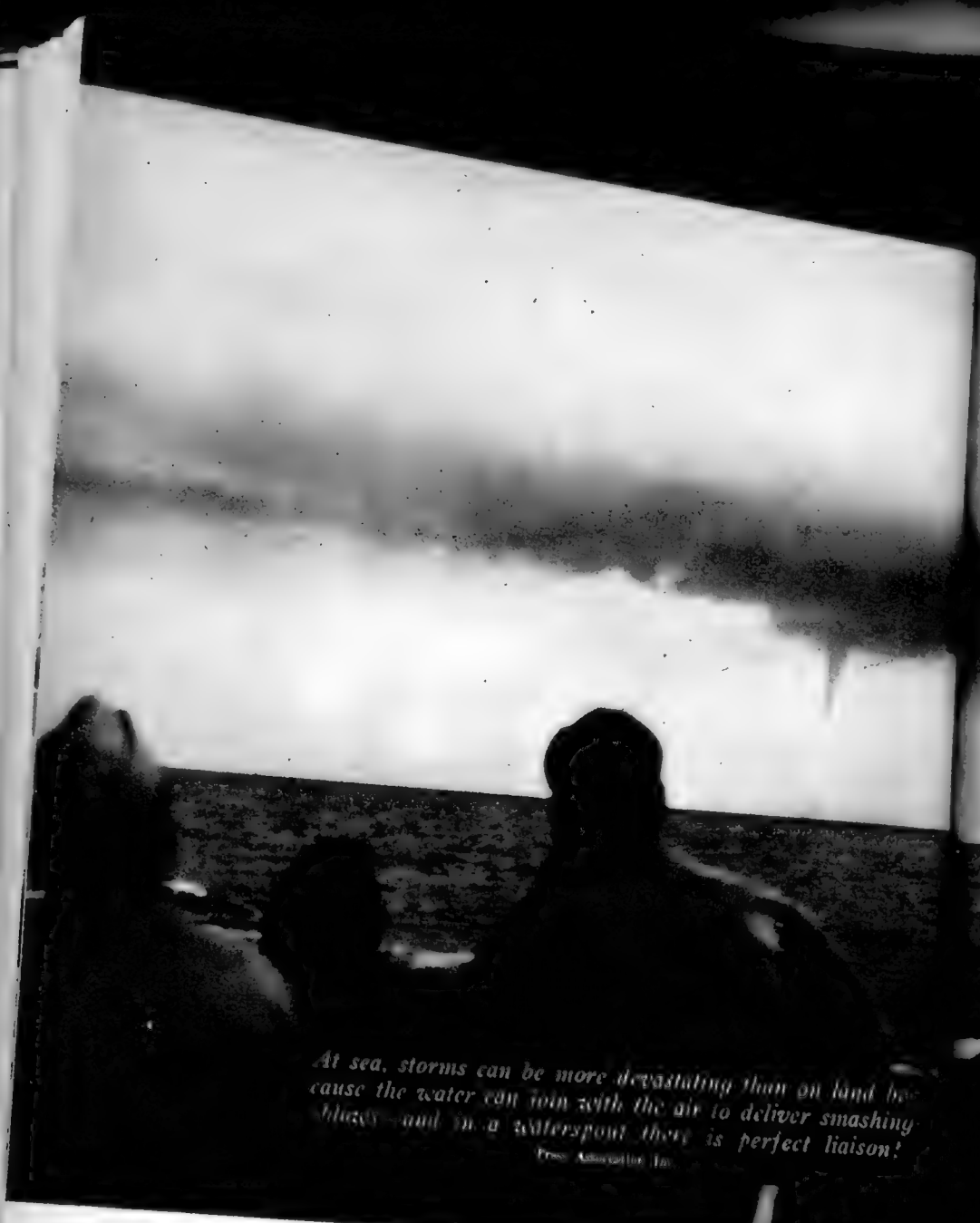
Since the sun's ultraviolet is chiefly absorbed by monatomic oxygen and ozone in the upper atmosphere—otherwise it would be quite destructive to the sort of life we know—that variation may cause vast changes in the stratospheric circulation, with resulting changes in circulation and weather near the surface.

The present state of this department of meteorology, however, is suggested by the paradox that the Earth is coldest, especially in the equatorial regions, during the sunspot phase when it is receiving most heat from the sun.

Humphries suggests an explanation for the paradox. Perhaps the unusual intensity of the ultraviolet during the period of sunspot maxima increases the formation of ozone, and this ozone facilitates the condensation of moisture at the base of the stratosphere, causing high cirrus clouds that shut part of the more intense sunlight from the surface.

The sun's weather, if it is ever completely understood, may turn out to be as complicated as our own. Sunspots are really storms of an inconceivable fury. The first problem of the long-range forecaster is likely to be a successful forecast for the sun. That may not be possible, from the surface of the Earth; our atmosphere is too opaque to the significant ultraviolet.

The logical answer, to the science fictionist, is an observatory out in free space, or perhaps on the Moon. Its instruments would not only study the sun's weather but also that in other variable stars, the



At sea, storms can be more devastating than on land because the water can join with the air to deliver smashing blazes—and in a waterspout there is perfect liaison!

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better to understand and forecast our own.

Besides variations in the sun's actual radiation, there are several other factors which influence the amount which we receive, and its effect. There is a regular change in the perihelion phase of the Earth's orbit, with a period of about twenty-one-thousand years.

At present, the Earth is nearest the sun about January 1st, receiving about seven percent more radiation than at aphelion, during our summer. Consequently, our winters tend to be short and warm in the northern hemisphere, and long and cool in the southern hemisphere —when the Earth is most distant from the sun, and moving most slowly in its orbit.

Croll's famous theory of the glacial ages associated them with slow changes in the eccentricity of the Earth's orbit, which would increase that effect. Ice caps might tend to build in the hemisphere subject to long cold winters—no such effect is now evident, partly because of the maritime climate of the southern hemisphere. But, as Humphries says, that theory requires that the ice ages occur alternately in the two hemispheres, and with a period of twenty-one-thousand years, which does not fit the geologic evidence.

Besides such astronomical factors, there are, of course, slow changes in the extent and composition of the Earth's atmosphere. Carbon dioxide plays an important part in the "greenhouse effect"—freely admit-

ting the short-wave radiation from the sun, and trapping the long-wave infrared from the surface. Any great change in the carbon dioxide ratio would affect the climate, but that effect doesn't seem adequate to explain the glacial ages.

Also, there are ceaseless changes in land elevation, in the distribution of land and water and consequently in the influence of ocean currents, and in the type of vegetation covering the land—all of which must influence the complex process of heat absorption and heat-transport that we call weather.

The advocates of the Wegener theory of continental drift suggested that past climatic changes were due to the land masses floating about the Earth, from one zone of climate to another, but that theory seems to lack any adequate motive power for the moving continents.

Humphries, in his "Physics of the Air," which is one of the more fascinating books of science, considers all these effects on the world's climate, and then sets forth at considerable length his own theory of vulcanism—which suggests that the climate forecaster must not only predict the weather of the sun, but also the behavior of the Earth's interior.

Benjamin Franklin was perhaps the first to speculate on the influence of volcanic dust upon the world's weather. In May, 1784, in a passage quoted by Humphries, he wrote:

"During several of the summer months of the year 1783, when the effects of the sun's rays to heat the Earth in these northern regions should have been the greatest, there existed a constant fog over all Europe, and great part of North America. This fog was of a permanent nature; it was dry, and the rays of the sun seemed to have little effect toward dissipating it . . . They were, indeed, rendered so faint in passing through it that, when collected in the focus of a burning glass, they would scarcely kindle brown paper. Of course, their summer effect in heating the Earth was exceedingly diminished. Hence, the surface was early frozen. Hence, the first snows remained on it unmelted, and received continual additions. Hence, perhaps, the winter of 1783-1784 was more severe than any that happened for many years.

"The cause of this universal fog is not yet ascertained. . . . Whether it was the vast quantity of smoke, long continuing to issue during the summer from Hecla, in Iceland, and that other volcano that arose out of the sea near the island, which smoke might be spread by various winds over the northern part of the world, is yet uncertain. It seems however worthy of inquiry, whether other hard winters, recorded in history, were preceded by similar permanent and widely-extended summer fogs."

Franklin seems to have been discussing the wrong volcano—perhaps he didn't know about the great eruption of Asamai in Japan. But his idea is sound. Humphries believes

But even with the handicap of slow delivery, the energy of the tropica storm can produce scenes in the United States reminiscent of Hiroshima

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the energy of the tropic
reminiscent of Hiroshim

that volcanic dust has a great—and unfavorable—effect on the weather.

Abnormally cold years appear to be associated with volcanic eruptions. Pyrheliometer records show that, during the years 1885, 1903, and 1912, the surface of the Earth received less than ninety percent of average solar radiation. The great eruption of Krakatoa occurred in 1883. Pelée and Santa Maria erupted in 1902, and Colima in 1903. Katmai exploded June 6, 1912.

The "greenhouse effect" of water vapor and carbon dioxide was mentioned above. But the fine volcanic dust which fills the stratosphere after a great eruption, causing red spectacular sunsets for many months, has just the opposite effect —the warming rays of the sun are shut away from the surface, while the Earth's own radiation can escape freely.

Humphries describes this cooling effect in detail. The average size of the dust particles can be calculated from the fact that they cause a reddish solar corona—observed in the years 1883, 1902, and 1912—known as Bishop's ring. From the dimensions of this ring, Pernter calculated an average diameter of 1.85 microns for this particle—a size equal to three or four wave-lengths of visible light.

Such particles settle very slowly in the dry stratosphere. Humphries finds that spherical sand grains of that size would require a year to sink from a height of thirty-five kilometers to the base of the stratosphere. Actually, he says, the finer

dust, reaching heights of forty to eighty kilometers, will be suspended in the stratosphere for two to three years.

The cooling effect of such particles is easy to understand. The visible rays of the sun, which carry most of its energy, have wavelengths around half a micron. The dust particles are large enough to reflect and scatter them. The radiation of the Earth, however, has its peak of energy at about ten microns. The dust particles are too small in comparison to absorb or reflect these infrared rays; there is only a slight scattering effect.

Humphries goes on to calculate the quantity of such volcanic dust that would be required to shut off twenty percent of the sun's radiation. The number of particles is immense—1734×10^{21} in the entire atmosphere—but the total volume required is only one fifteen-hundredth part of a cubic mile. In an era of mountain-building, such additions of dust to the atmosphere don't appear unlikely. And geology, very convincingly, says that the glacial ages were periods when great new mountains rose.

The heat equilibrium of the Earth is rather delicate. A change of say 6° C. in the average temperature —which might easily be caused by such volcanic dust—doesn't seem very great. But the effects of such a drop in temperature, during only a few years of intensive volcanic activity, would endure for many centuries.

A fall of six degrees will lower the freezing level two thousand feet in the atmosphere, lower the snow line on every mountain by some similar amount, and crowd the temperate zones hundreds of miles toward the equator. The snows in the winter hemisphere will fall earlier, lie later, and spread hundreds of miles toward the tropics. And snow reflects most of the incident radiation, which bare ground or vegetation would have absorbed.

That fact is catastrophic. The swiftly spreading snow fields raise the albedo of the planet from its present forty percent, somewhere toward the eighty percent of snow itself. Cold sunlight is reflected back to space, and the frozen planet shines a little more brightly to its neighbors. The volcanoes may lie quiescent and the fatal dust quickly settle, but only hundreds of slow centuries can thaw the snows and restore normal albedo.

A successful forecast of the next glacial epoch, then, will depend on a prediction of the violent events beneath the Earth's crust. The climate forecasters of the future must have their seismograph stations deep in abandoned mines, and down on the ocean floor.

Now let us turn a little nearer to today, for a look at the important new developments that already promise better forecasts for tomorrow. The most spectacular—and the one already most familiar to science-fiction readers—is the rocket.

It is obvious, even from what we read in the newspapers, that a great deal of our pre-war astound-

ing fiction is now technical fact—although many of the details are still military secrets of one power or another. The rocket ship is only one example.

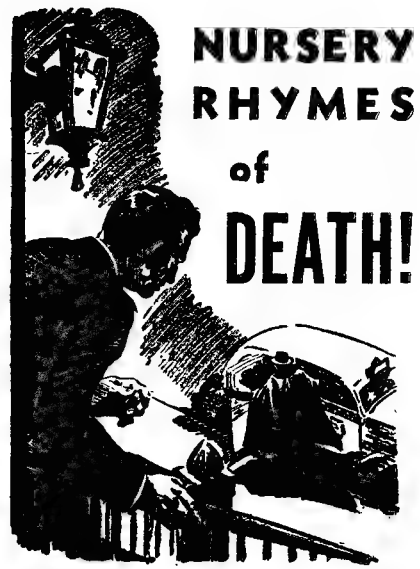
For the tailless German ME-163 is a true rocket ship—as distinguished from the jet-propelled planes, such as our own P-80, which burn atmospheric oxygen. The ME-163 carries all its own fuel, and might theoretically climb out of the atmosphere.

And the German V-2 rocket, according to the British Ministry of Information, reaches heights of sixty miles and speeds above 3,000 mph. If fired straight upward, such a rocket might climb one hundred miles, which is probably as high as the atmosphere is dense enough to have any meteorological importance.

Those are developments by the enemy. But by 1940, the great American rocket pioneer, Dr. Goddard, had solved the problems of building a satisfactory rocket motor and stabilizing the rocket in flight. He was then working to reduce the weight—a "pay load" of a few pounds, of course, will be enough for the rocketsonde, instead of the ton of high explosive carried by the V-2.

Willy Ley—whose fine recent book on rockets was reviewed in this magazine—is now an American citizen, working in the United States. There is no reason to believe that American rocket-science is far behind that of the Germans.

The rocketsonde, obviously, is merely a matter of money, time, and



When Diane Marlow stepped into that taxi, it was the beginning of a trip to disaster cloaked behind innocent verses of Mother Goose. Only the Master of Darkness could read between those childhood lines and see a solution to the flood of crime!

Read the thrilling, book-length novel, MOTHER GOOSE MURDERS, in the March issue of

THE SHADOW

AT ALL NEWSSTANDS

the development of satisfactory instruments. But those instruments, to be carried aloft by the rocket, are going to pose some nice problems for the engineers. Let's look at some of the specifications.

The meteorologist will want to know the pressures and the temperatures of the higher stratosphere. These elements are related, of course, so that either can be determined from the other. But some interesting new gadgets will be required, to measure either one.

Only about one percent of the atmosphere lies above the extreme range of sounding balloons. Pressure differences will be small; the instrument must be delicate. Accurate temperature measurements will be still more difficult. The speed of any efficient rocket must be measured in thousands of miles an hour—but skin-friction raises the temperature of even a modern airplane as much as five degrees above that of the air, and meteors illustrate the effect of friction at much higher velocities.

There are other quantities we shall want to measure. Is there any increase in the percentage of the lighter gases, hydrogen and helium, at high elevations?—the old theory of the stratified atmosphere is discredited, but not entirely disproved.

What about the maximum concentrations of ozone, and of monatomic oxygen? In fact, the whole subject of the radiation received from space and its effect on the atmosphere—a question as important to the radio engineer as it is to the meteorologist—is waiting for the actual measurement of things now known only indirectly. And all of the answers, of course, will suggest new questions.

The equipment for the rocketsonde must be light—rocket transportation is expensive. It must be rugged enough to stand high accelerations. It must respond very quickly, for a rocket isn't at one point long. Probably, like the radiosonde, it will have to carry its own transmitter—recording instruments would not often be recovered intact, after a fall of one hundred miles.

The greatest problem is perhaps how to sustain the equipment at any one level long enough to get accurate readings. The first natural suggestion is a parachute, which will open at the top of the flight and let the robot observer transmit its data during a leisurely descent. But the trouble is that the air at one hundred miles above is probably too thin to open or sustain a parachute. Other equally difficult problems, however, have been solved.

One of the ultimate answers may be a rocket ship circling the Earth at some five miles a second, just above the atmosphere. Centrifugal force would support it there, like a tiny moon, without use of additional fuel. That doesn't solve the problem of wind friction on the instruments, but it would allow an accurate study of the radiation reaching and leaving the atmosphere —an item of first importance.

Another weather-forecasting technique of great ultimate promise is

the use of analogues. The method itself is quite simple, although it has involved an immense amount of labor. This is the most recent and successful of various efforts to forecast the weather by mechanical and mathematical means. It even suggests the possibility of a robot weather forecaster, in some future scientific utopia.

The analogue method is based on the plausible assumption that the same cause will lead to the same result. The analogue for today's weather map is the map for some past date, which shows the same weather situation. The map for the following day, so the theory runs, will show tomorrow's weather.

Weather data covering the past forty-five years have been collected, and a series of daily maps covering the entire northern hemisphere prepared from it. As one leafs through these maps, it is fascinating to see the birth, growth, and movement of storms and fronts; the vast patterns of the air flow are revealed.

These maps have been given numerical designations—from the position and intensity of the various pressure centers, for example—so that the numerical description of each map can be punched on a card.

The whole system is rather similar to that used by the FBI for fingerprints. After today's weather map is analyzed, a card is punched to represent it. Then all those in the file are run through sorting machines, to find similar situations in the past.

From a number of maps indicated by the machine, more exact methods can be used to pick out the best analogue. Then, from a study of the maps for the following days, showing the motion and development of the pressure systems, the forecast is made.

For all the grim testimony of bomb-shattered enemy cities, however, the analogue method still has its limitations. The best available analogue is never quite an exact duplicate of today's weather map, and the next day's map is likely to differ still more from tomorrow's.

The science-fictionist, of course,

is free to imagine a weather service which has overcome such handicaps. The weather records of this utopia go back for some thousands of years—and there were never any instrumental errors, nor any indiligent observers who "jawboned" their reports.

This future weather system, in fact, can be entirely automatic. The data are relayed, from robot weather stations, to machines that analyze it and punch the results on cards. The cards are fed into sorting machines, and the robot delves through its immense mechanical memory. It discovers the day, perhaps many centuries ago, when the weather situation over the whole planet was exactly the same. Then it clanks and whirs, and prints a forecast based on the weather that followed that ancient date. Our carefree utopians can plan their picnics accordingly.

Fortunately for meteorologists of the present generation, better forecasts need not wait for that weather machine. Great advances will doubtless result from the refinement and extension of methods already in use.

The master forecasting stations of tomorrow may well receive teletype and radio reports from all over the planet. The polar regions are important as sources of the cold air masses. Possibly automatic stations will one day transmit data even from the forbidding ice-plateaus of Antarctica.

A great deal of work is now being done, to correlate the entire pattern of the air flow, up into the stratosphere, with weather at the surface. The new theories now emerging will no doubt make better forecasts possible, even with the same data as before.

Weather-forecasting may even become a science.

And another fascinating possibility is yet to be considered, although it really involves begging the question. One simple mechanism designed to produce unpredictable results—though they are hardly unpredictable by comparison with the weather—is a pair of dice. But dice can be loaded, and the variable factors that change weather and climate may one day be controlled.

Climate control, however, will require a good deal of power. The atmosphere is more massive than it looks; it weighs a ton on every square foot. An air mass in motion has an almost astronomical momentum. A tiny fraction of the energy required to divert a storm will always take you to sunny California. It seems a reasonably safe forecast that the weather will remain for some time an important topic of irrelevant conversation.

THE END.

Lady Dog

by A. BERTRAM CHANDLER

***The** more complex, sensitive, and responsive a machine becomes, the more closely it approaches a living organism. Fine—but what if the darned thing begins to believe it is a living organism . . .?*

Illustrated by Williams

Some ships are utterly devoid of the happy knack of inspiring affection in the hearts of their crew. Such a one was *Emma*. Worse—she seemed determined throughout her career to get herself cordially disliked. Not that she did anything *really* bad—vessels such as she usually run short of placing themselves in situations involving actual physical danger. To themselves, that is. *Emma's* officers usually lived on the verge of apoplexy.

In her endearing little ways she was utterly dissimilar to the rest of the E Class, whose prototype she was. They—*Evelyn, Elizabeth, Elvira* and *Eve*—were sweet jobs. Just general cargo carriers they were, tramping between the worlds for odd parcels of freight, and with accommodation for an occasional, infrequent handful of passengers. And they were the first ships to be fitted with the Brain.

Very labor-saving is the Brain. Just a swirl of electrons and dynamic magnetic fields in a hard vacuum,

and it runs your ship for you. It takes care of everything. Internal pressure and temperature, alterations, of course, to avoid meteorites and such, and the subsequent adjustments of orbit. Soon, they say, it will be able to handle landing and blasting off. If it could only cook!

Were it not for the very stringent safety measures insisted upon by the Board, the majority of ships would run unmanned. But neither Man nor Machine is infallible, and so a full complement is carried yet. This gives a double safety factor and means that, in the unlikely event of failure or breakdown of the Brain, the vessel is brought safely to port and not left to roam the spaceways as a menace to navigation or, worse still, to crash like an enormous bomb on one of the inhabited worlds.

Emma may or may not have possessed a soul. That is a moot point. MacFarlane, the navigator, swore that she did. Good Scot that he was, he could not imagine a piece of machinery without one. Good Scot that he was, he believed that the soul of a machine was made evident by its smooth, sweet running. According to his lights *Emma* was a hopelessly lost soul.

Captain Evandale shared the beliefs of his senior watchkeeping officer. And yet, it may be, he took a kind of perverse pride in the very perversity of his command. She had driven at least one of his predecessors to chronic alcoholism, two to a nervous breakdown. But he, as he was fond of telling himself, and others, was made of sterner stuff. It was just that he was convinced that *Emma* would never risk her own precious skin. Botched landing in every spaceport of the Solar System invariably meant damage to something or somebody—but never *Emma*. Damaged cargo—well, by this time the Board knew what to expect from the pride of the E Class and were mildly surprised if nothing at all went wrong. Spoiled meals were harder to bear—even the cooking equipment was affected by the general blight—but the cadet whose turn it was to officiate in the galley would take his bottling in a philosophic spirit and get busy with the can opener.

But *Emma's* final effort was something new.

MacFarlane was on watch when it happened. He was sitting on his shoulder blades in the pilot's chair, his feet on the control panel, smoking his stinking pipe and thinking of nothing in particular. His untidy, sandy hair surmounted his angular face like a disreputable halo. Had it been any other ship but *Emma* he would have been keeping his watch in the smoking room, making a fourth at bridge or throwing a wicked dart in the current darts tournament. But this was *Emma*—and one couldn't be too careful.

With nerve-shattering suddenness the alarm bells woke into clamorous life. At the same instant the port auxiliary jets cut loose, the abruptly shifting gravities depositing the navigator ungently on the deck.

He didn't take time off to curse. Like all of his cloth he was not yet fully convinced of the Brain's ability to handle a routine alteration of course, such as this obviously was. He looked first at the forward screen. It was blank. The wing screens, too, exhibited no signs of life. But the after screen—*that* was another matter. It was alive with points of light. MacFarlane felt a sudden chill coursing up his spine. This was no mere meteoric swarm—the regular grouping of the little lights made that much obvious. It could only be—it must be—the invasion from Outside about which the more gloomy fiction writers had woven their plots for the last three or four generations. He hurriedly pressed the button of the captain's private alarm bell.

Normally, Captain Evandale was a big, slow man. He went about his business in a manner that seemed to betoken dignity, rather than efficiency. Yet, when circumstances demanded it, he could move fast.

His entry into the control room was little short of meteoric. He knew his officers, and knew that he could trust his navigator to call him at once if necessary—and not to drag him out for a purely routine matter.

"What is it?" he demanded breathlessly.

For answer the other pointed mutely at the after screen.

Evandale whistled softly.

"What do you make of it, Mac?"

"Ah canna say, sirr. But it looks awfu' like a grrand fleet oot there. And ye'ken we ha' nane—anely twa monstrrosities they ca' drrreadnoughts—"

For long moments the captain studied the screen. He watched the strangely rhythmic dance of the little lights, regarded intently their slow, regular systole and diastole. He began to shake with uncontrollable laughter.

"Oh, Mac!" he cried at last, "you'll be the death of me. You and *Emma*. Can't you see, man? *She's* doing it, just to put the fear of God into us all. Here we are, on maximum acceleration from Venus to Callisto, and here's a big fleet of ships apparently coming up from dead astern, but fast. That I might believe. But I'll never believe that any squadron, or any ship, could, or would, behave in the way that they're doing. According to the screen they're performing some utterly fantastic, impossibly complicated and even more impossibly precise evolutions. And judging from their apparent advance and recession they must be alternating between maximum acceleration and dead stop. Switch over to manual, will you?"

Obediently the navigator threw open the switch which, when closed, made the Brain master of the ship. There was now no connection between the screens, or the controls, and that mysterious bundle of etheric ganglia. *Emma* was on manual—and Captain Evandale was her brain.

"Look!" he said.

All the screens were dead.

"It must have been a faulty screen

circuit," suggested MacFarlane.

"You can make the routine tests, Mac, but I doubt very much whether you'll find anything wrong there. The way those lights were behaving, the patterns into which they threw themselves, suggested something to me. You've seen the lines of force you get with a magnetic field—you know, the old experiment with iron filings on a sheet of paper over a magnet. Well, that's what the pattern looked like. And the only two sources of magnetic fields in this ship are the converter and—the Brain."

"But, sir! It can't be the Brain. I know we don't trust them overmuch, but—"

"You know *Emma*, Mac. If there's anything that *can* go wrong she'll make it go wrong. And the clever beggars who make the Brains always put spares aboard just in case. Suppose we have a look at it. Wait. First of all we'll tell the others what's been happening—they must be literally eaten up with anxiety and curiosity—mainly curiosity."

Whilst Evandale was out of the control room MacFarlane put the screens through the routine tests. As the captain had predicted, there was no fault to be found. When Evandale returned he was taking Meyerling's "Electronic Brain" from the book rack.

With the Old Man was Stannard, chief pilot. With the three of them the control room was uncomfortably crowded. That was the main fault of the E Class—lack of room in working spaces.

"I suppose you've tested the screens," said Evandale.

"Yes, sir. I was just going to run through the manual to see if it would give us any pointers."

"I hope you and Stannard know something about the beastly thing. It'd never even been dreamed of when I was up for Master. What's the extent of your knowledge, Mac?"

"The usual six months' course, sir. But I warn you—there are only three men in the whole System who really understand it."

"And you're not one of them, I take it. And you, Stannard?"

The chief pilot shook his head.

"Well, if you can't fix it, it just means manuals all the way to Port Strogoff. It'll do you lazy beggars no harm, anyhow."

MacFarlane was leafing rapidly through the book.

"It seems," he said, "like Pawson Effect. And that means that the brain case is no longer air-tight—that there's no longer a hard vacuum inside. This will not, of course, affect the magnetic fields, but it will interfere with the free movement of the electrons. It—"

"Spare us the technicalities. Can you fix it?"

"Well—"

"Can you fix it?"

"I think so, sir. If it's Pawson Effect, yes."

"What do we do first?"

"We shall have to shut the air-tight door, and then evacuate all the atmosphere from the control room. Of course, we could remove the top hemisphere first—but then we

shouldn't be able to make the final test."

As he talked he was pulling the spacesuits from their locker. The three men helped each other on with the clumsy, heavy clothing. Their faces were already streaming with perspiration when they snapped shut the visors of their helmets.

MacFarlane's gloved hand went out of the air-tight door control.

"All right to carry on, sir?" he asked.

"Yes, Mac. You and Stannard do the job—I'll watch."

Silently, the door slid shut. Stannard satisfied himself that all was in order and then opened the valve that would let the air of the little compartment rush out into airless space. Meanwhile, the navigator had produced from the spares locker a brush and a can of some viscous substance. With this he carefully coated every inch of the surface of the spherical casing. The needle of the pressure gauge on the control panel quivered, then traveled steadily round to zero.

"Look!" cried MacFarlane, his voice tinny in the helmet phones. The others followed his pointing finger with their eyes. There, on the smooth, glistening surface of the upper hemisphere, a bubble was growing. It swelled rapidly from a pea to a plum, from a plum to a football bladder. It burst. By this time the viscous film had hardened, so that the bubble in its bursting left a permanent record. The three men peered intently at the little circle—like a tiny Lunar crater it was —but not even with the aid of the control room magnifying glass could they find the flaw. Yet flaw there must have been.

Again MacFarlane went to the locker, taking therefrom a steel bar about six feet in length. On top of the upper hemisphere of the case was a ringbolt, through which the bar would just pass. He took one end of the bar, Stannard the other. Together they pulled, hard. Evandale could hear the little, involuntary grunts as they tugged and strained.

Each hemisphere of the brain case had a projecting rim. In the upper one were four slots, oval in shape. There were four corresponding holes in the lower rim, evenly spaced, circular in section. These had a screw thread. Beyond assuming that they were of some use in assembling the contraption Evandale had hardly noticed them. But he watched them now, and saw the semicircular end of the oval slot, which had been in exact alignment with the edge of the circular hole, slide out of line very slowly.

"She's moving!" he shouted.

"Ay, an' aboot time,"—Mac's excited again, thought the captain—"but it willna be long the no'."

Now he and Stannard were walking round the case almost like windjammer sailors around the capstan. Evandale found himself very much in the way and hurriedly fell back among the controls. Even so, it was slow work, for the thread was incredibly fine and fitted with microscopic exactitude.

At last, in startling distinction

against the gleaming metal of the threads, appeared a hair-thin, dead black line. The Old Man heard MacFarlane grunt, *"Easy, the no'!"* He and Stannard slowed their pace, then stopped.

"The guide rods, Stan," ordered the navigator.

The chief pilot went to the locker and brought out four steel bars. One by one the other passed their threaded ends through the oval slots, screwed them home in the circular holes. He cursed a little at the clumsiness of his spacesuit gloves, but the task was soon finished.

Then—"Will you put out the lights, sir?" As Evandale hastened to comply he was told—"and we'd better have the shutters up, too."

The control room was now in pitch darkness. The captain guessed that his two officers were now turning the upper hemisphere through the last five or so degrees of arc permitted by the oval slots. Then there was light again—of a sort. He saw McFarlane and Stannard, black, grotesque figures against the bowl of palely swirling fire that was the lower hemisphere of the brain case. He saw them lift the upper hemisphere, sliding it up the guide rods. He left his post by the control panel and moved a few, cautious steps so he could look at the Brain.

It was the first time that he had ever seen one. To him they had always been just a bundle of swirling nothingness inside a black globe. Now, he saw that he was face to face with naked Power. Not the crude power of an atomic reaction motor, but something more subtle and more—dangerous. Yes, that was the word—*dangerous.* Here, he knew, was the monster that would some day destroy its maker. And he was suddenly afraid.

Untiringly, unceasingly, eddied the pale blue flame. It seemed as though it were continually being sucked down a vortex none knew whither, and being ceaselessly replenished none knew whence. And there was an ebb there, and a flow, rhythmic and hypnotic. He felt that if he could only gaze at its heart for long enough he would know the answer to all the questions that had troubled the heart of Man from time immemorial. He—

With shocking abruptness the black hemisphere of the spare case came down and shut off the uncanny, gripping spectacle.

"Lights!" he heard somebody say.

Mechanically he stumbled to the switchboard. Moving without conscious volition his long experienced hand found and pressed the switch. The harsh, glaring light seemed to dispel the morbid fancies that had oppressed him whilst staring at the Brain. With interest he watched the two officers give the upper hemisphere the small turn permitted by the slots and guide rods, and then, one by one, remove those rods. MacFarlane took his brush again and put a very thin coat of the viscous compound on each of the surfaces of the rim that would be in contact. Then he and Stannard brought the steel bar into play again, and the upper half of the

case was rapidly screwed home.

With his sheath knife the navigator shaved off such small shreds of the sealing composition as had been extruded from the union.

"An' that's a' for the day," he said.

"Suppose this one leaks?" asked Evandale.

"The domes are tested up to four atmospheres before they leave the laboratory," replied the other. "Of course, there *may* be a flaw—as there was in the old one. In which case it will make itself known after a few days of the drive vibration. As for the joint—we'll see as soon as we let the air back. If any gets in there we shall see a most definite depression in the seal. Shall we let the air back now, sir?"

"Go ahead. If you're satisfied, Mac, it must be O. K."

Stannard turned the wheel of the valve admitting atmosphere from the body of the ship. They saw the furious little jet, its moisture condensing and freezing as it was subjected to a rapid—almost instantaneous—decrease of pressure. As things became more nearly equalized it was no longer visible, but its thin, high whistle was distinctly audible through the helmets of their suits. The whistle ceased, but it was not until the pressure gauge registered the standard one atmosphere that they rid themselves of the heavy discomfort of their protective clothing.

"Who is on watch now?" asked the captain.

MacFarlane glanced at the clock. "Mr. Kent, sir."

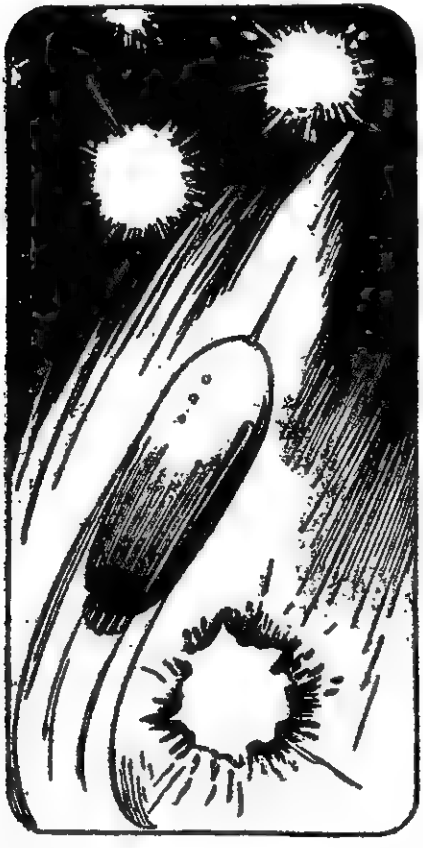
"Right. Switch over to Brain Control, call Mr. Kent in and tell him to let us know at once if anything misbehaves. And you and Stannard come and have a spot with me before lunch."

Three times had the hands of MacFarlane's twenty-four-hour chronometers circled their dials. The navigator was on watch. This time he wasn't blissfully idle, he was working out, for his own amusement and satisfaction, a knotty problem in celestial mechanics. He reached for the ephemeris, then paused, his hand poised in midair. Something was wrong with the book rack. It was quite a while before he placed it. The books were in their right order, that was the first thing he checked. But there was *something* wrong. Then he cursed his stupidity. On the leather bound back of Mikalelin's "Principles of Interplanetary Navigation" was a spot. It is probable that nobody else would have noticed it at this stage—but MacFarlane in his control room was like a houseproud woman. And it wasn't a spot of dirt or fluff—it was growing. As the navigator watched, spellbound, its expanding rim overlapped the "G" in the last word of the book's title, and then, a little later, encroached upon the "I" and "A." Its color, too, looked somehow wrong. It was an unpleasant, iridescent purple and stood out in unhealthy relief against the brown of the binding.

MacFarlane stretched a tentative finger and gingerly touched this

blot upon the immaculateness of his domain. It felt unpleasantly cold and slimy, and he could have sworn that it pulsed and stirred beneath his fingertip. For a few seconds he sat immobile, pondering, then decided that this might well be a serious matter. He picked up the telephone and put through a call for the captain and the surgeon.

Evandale was first on the scene. He was an astronaut, not a biologist, and he was at a loss. The mysterious purple stain was spreading rapidly now. He didn't like the look of it, and raised a hand to stop MacFarlane as he made to lift the book from the rack to stop the blight from spreading to his other volumes. He was a little too late, however, and the offending book was placed on the plastiglass desk top. Luckily whatever it was seemed to prefer leather to glass.



They heard Gwynn's quick footsteps up the ladder leading to Control. The surgeon's entry was typical of the cock-sparrow jauntiness of the little man.

"What's w r o n g ? What's wrong?" he demanded, briskly washing his hands with invisible soap and water. "Mac want me to operate on the Brain for a cerebral tumor?"

Evandale was not amused.

"No, doctor," he replied stolidly. "It's this."

He indicated the volume on the desk. Now all the gilt letters of the title on the back were completely obliterated, and the stain was spreading to the covers.

"Looks like a slime-mold of sorts, sir. Where did it come from? Mind if I take this book down to my laboratory? Be right back."

And Gwynn was gone, holding the book with the utmost care, almost as though it were liable to turn and bite him at any moment.

"I wish he'd take life a little easier," commented Evandale. "He'll come rushing back in two seconds flat and tell us all about it. Meanwhile, what do *you* make of it, Mac?"

"I suppose it must be a mold of

some sort, sir. Rather like the story they tell of the discovery of penicillin."

"But where *did* it come from? And why has it only just put in an appearance?"

"The guid Lord alane kens—"

"Very interesting. Very interesting!" Gwynn was back, his pale eyes gleaming with enthusiasm behind his spectacles. "A most definite alien life form. Of course, may be mutation. Can't tell. Haven't the facilities."

"But what *is* it?"

"Don't know. It's rather like a slime-mold in its behavior, but the cells of its structure seem to retain their identity. So far it hasn't produced any sporangia"—*give it time, man, give it time,* thought Evandale—"perhaps some kind of sexual union is necessary first between the individual cells, as in the case of Terran slime-molds.

"But its present rate of growth and proliferation—stupendous! Reproduces by fission, of course, but three, *three* new individual cells after each division!"

"But where—?"

"Don't know. Find out sometime perhaps."

"My book—" began MacFarlane.

"Send it back. Taken covers, sorry. Have to take these covers too," he pointed to the book rack, "unless I can find some other food. Maybe shoes—"

He grabbed a couple of leather-bound volumes before the navigator could stop him, and clattered once more down the ladder.

"If I'd anely kenned," said MacFarlane bitterly, "I'd ha' soaked yon beastly thing wi' every germicide in the First Aid box!"

Days later the origin of the slime-mold was still a mystery. It should not have been. The long dead and gone, but not forgotten, Svante Arrhenius would have known. But he was a biologist—even though by profession a chemist—and he had a pet theory. *Emma's* officers had, of course, heard of Arrhenius—but none of them were interested. With the obvious exception of that other amateur biologist, Dr. Gwynn. And he had always refused to accept the Swede's theory as to the extraterrestrial origin of mundane life.

And the mysterious, extra-terran life form no longer took first place in all conversation. Gwynn still continued with his experiments—he had, by this time, concocted a pabulum on which the mold would thrive, although it still resolutely refused to produce any sporangia—and MacFarlane still gazed sadly at the row of books bound in makeshift cloth and pasteboard.

He was doing just this when the alarm bell rang. There was no alteration of course immediately after so he considered there was no cause for alarm. The Brain had been behaving very well since the shipping of the new case. The navigator was no nearer to comprehension of the theory of the thing—it was said that at least twenty years of intensive study were necessary—but having repaired it himself he had lost his original mistrust. His at-

titude now was that of a doting father toward a rather incomprehensible but perfectly sweet and well-mannered child.

As a matter of form—after all, it was what he was paid for—he glanced at the screens. His manner lost its carefree indolence. The blue halo around the little spot of light that was, apparently, approaching from the starboard beam denoted that this was no mere meteorite but a man-made object, manufacturing and consuming energy. A ship.

His latest Notices to Astronauts gave no indication of any vessel on a contiguous orbit. It might be —he smiled at the fancy—a pirate or an invader from Outside; it probably was one of the two dreadnoughts.

As a matter of fact the idea of space marauders would not have been too farfetched. These very battleships owed their existence to Broderick's fortunately short-lived career of piracy in the Jovian Mail liner *Thunderbird*. After this interesting little effort the Federation decided that its little ships—patrol cum survey cutters—weren't enough to deal with any really determined attempt to upset the peace of the System. Hence the battlewagons.

MacFarlane made hasty calculations from the data at his disposal. The other ship, he saw, would pass a few miles ahead of *Emma* on its present course. Had it been a collision orbit the Brain would have pulled *Emma* clear of danger.

He pressed the switch that linked up the big, mounted telescope to the screen circuit. He saw the instrument swing, then steady. He set it to his own focus and then gazed long and fixedly out into the black of space. At last he picked up the telephone, set the pointer for the captain's room, and pressed the button.

"Vessel of *Lord Nelson* class approaching on starboard beam, sir," he announced.

"I'll be right up," came the answer. Faintly he heard the captain's voice addressing a third person—"Coming up to look at the big ship, Doc?"

When Evandale and Gwynn arrived the dreadnought was just visible to the naked eye. MacFarlane turned from his telescope.

"*Lord Nelson*, sir."

"How do you know, Mac?"

"I did my Reserve Officer's training in her. And *John Paul Jones* has Hollister Projectors in those after sponsons instead of guns."

"Wonder what he wants? Just playing at policeman, I suppose. A pity they can't find something better to do than interfering with the routine of peaceful merchantmen."

Closer and closer came the big ship. As she approached she adjusted her orbit so that it was more nearly parallel with that of *Emma*. Those in Control, and those crowding around the smoking room ports, could see the evanescent flashes of even more intense brilliance at her stern as she did so.

Silly, calling dreadnoughts "she," thought Evandale. *With all those guns and turrets and things, which just can't be streamlined, there's a*

definite masculinity of appearance—

The R. T. speaker crackled, then inquired in a cultured accent—*"Lord Nelson* to unknown vessel. What ship, please?"

"Don't they get Notices?" growled Evandale. "Here, give me the mike!"

He raised the instrument to his mouth.

"Emma," he barked, deliberately coarsening his voice. "Port Lemaire to Port Strogoff with gauna nuts and mercury."

"Speak up, please. I can't hear you for that infernal mooing noise. I suggest that you check your transmitter."

"What mooing noise?" bellowed Evandale.

"Like a lovesick cow."

"Must be your receiver!" He covered the microphone with his hand. "Mac! For the love of Mike look at our set! *Emma's* up to her tricks again and making us all look ruddy fools in front of these glorified policemen!"

Hearing no reply from his navigator he turned his head to see what that officer was doing. He, with the surgeon, was staring intently at the starboard screen. At first Evandale couldn't see what was wrong. Obviously, at this close range *Lord Nelson* should have appeared not as a spot of light but in silhouette. This was the case. And then the captain saw that far more detail than one could reasonably expect was exhibited. Furthermore, there was something most definitely wrong. For long moments he couldn't lay his finger on it. Then he was reminded of his idle thoughts of a short while ago anent the essential masculinity of men-o'-war. What he was looking at wasn't a reasonably accurate facsimile of the dreadnought but a caricature in rather bad taste. *Rather* bad taste? He looked again. It was subtly yet unmistakably obscene.

"The Brain!" he cried, "it's going haywire again! Switch over to manual before we do something really bad!"

MacFarlane hastened to obey. His fingers closed over the handle of the switch. He pulled. There was a tiny splutter of blue sparks as the circuit was broken. Then—from its position in the instrument rack—a pair of steel-tipped dividers lifted, opened, and shot with unerring accuracy to bridge the gap left by the opening of the switch. With his bare hands the navigator tried to dislodge the fantastically makeshift connection. The shock flung him out of his chair to crash headlong into the lockers along the port semicircle of the control room.

They heard the port steering jets thunder briefly, felt the surge of acceleration as the main drive madly cut loose. *Emma's* nose swung in a swift arc till she was heading straight for *Lord Nelson.* It seemed that they must crash, that both ships must become one common mass of flaming ruin. When collision seemed imminent, when the huge hulk seen through their view ports blotted out the very sky, the steering jets gave tongue again. Had *Lord Nelson* taken no avoiding

action there would have been, perhaps, the thickness of a coat of paint between the two vessels.

But whoever was at the dreadnought's controls had his wits about him. She, too, swung just before the moment of impact. Had she swung the wrong way nothing could have saved her. As it was, the fury of her main and auxiliary drives washed *Emma* with a flood of dazzling, coruscating atomic fire.

Once again the R. T. came to life.

"*Lord Nelson* to *Emma*. What are you doing? I'll have you on Ceres for this!"

"Sorry," replied Evandale inadequately. "My ship appears to be out of control."

"Get her under control at once and wait for my boarding party!"

"Get her under control yourself," muttered the captain. "Easier said than done, you brassbound nincompoop—"

MacFarlane was still out—the few moments of excessive acceleration had done nothing towards bringing him around. "Get the engineer on the 'phone, Doc," ordered Evandale. "Tell him to cut the drive—kill the converter—anything he likes! Meanwhile—"

He looked around, then remembered that there was a pair of rubber gloves in the tool locker. He put them on. Gingerly he took hold of the dividers, still in their position across the switch. He pulled, hard. They resisted his efforts. As he braced himself for a tug that would do justice to the situation he heard Gwynn saying that he could get no reply from aft.

Whatever answer he intended to give was wiped completely out of his mind by what happened next. From the locker, whose door, unthinkingly, he had left open, sailed a heavy wrench. From the corner of his eye he saw it coming and dodged back. The tool grazed the back of his hand, skinning his knuckles and tearing the thick glove. It crashed into the switch. Contacts and dividers were pounded and crumpled. To switch over to manual now would be no easy task.

Again the R. T. speaker was blaring.

"*Lord Nelson* to *Emma*! *Lord Nelson* to *Emma*! Suggest that if you cannot get your ship under control you abandon! Suggest—"

The battleship's suggestions were cut short as *Emma*, having swung around in a graceful arc, once again accelerated violently towards the other. For long seconds the ships flashed through space on parallel orbits, hulls almost in contact. It seemed that the merchantman was continually edging in towards the battlewagon, who, at the same time, was frantically trying to edge out. Too sharp a swing would bring her vulnerable stern into violent, damaging contact with the runaway.

MacFarlane had come round. He staggered to his feet, took in at a glance the mess the heavy steel wrench had made of the control panel. Through the ports he saw the colossal bulk of *Lord Nelson*, closer by far than he had ever seen another ship in the whole of his

astronautical career. Closer than he would ever see another ship.

He realized what must be done. He staggered to the tool locker, fumbled for a few seconds, and produced a hacksaw. It was a fine tool—only the best in the way of equipment was able to come up to the high standards of the Board. Its steel blade was almost diamond hard. With this it would be scant seconds before the armored control cable from the lower hemisphere of the Brain was irrevocably severed.

Side by side the two ships raced through the void. At first *Emma's* bow hung level with *Lord Nelson's* midship section. Then *Emma*, somehow, succeeded in squeezing out more than the standard three gravities for which her engines had been built. She forged ahead. With her uncanny mastery of magnetic fields she should have foreseen what was bound to happen. As the free magnetrons surge from the converters, every ship in space becomes a magnet. And now it was a case of like pole to like pole as the bows drew level. Like repels like—and merchantman and man-o'-war sheered violently and suddenly apart.

As MacFarlane started work on the armored cable, the R. T. started up again.

"Admiral to Master! Admiral to Captain Evandale! I give you ten minutes to abandon ship, and then I open fire. Do you hear me? Ten minutes—and I open fire!"

The keen blade of the little saw bit into the armored cable. The rubber insulation was bared, and then a gleam of bright metal showed. Only a matter of seconds now. But the tool was snatched from MacFarlane's hands. Momentarily, it hung in midair before him. Then it was bent into an impossible arc before it snapped. The navigator barely dodged the sharp, jagged fragments as they were flung in his face.

Evandale and the surgeon, stumbling over the other in their haste, made for the spares locker. Unheeded, vivid atomic fire washed once more over the ports as *Emma* skimmed *Lord Nelson's* stern. Again the speaker blared: "Ten minutes—and I open fire! Ten minutes—and I open fire! Do you hear me?" But Evandale and Gwynn had found the way to immobilize the monster that had taken charge of the control room.

They found the steel bar—inserted it through the ringbolt of the upper hemisphere of the brain case. They strained with cold desperation. Once the mad machine lay naked before them they could do *something* to it.

They never had the chance. The bar was seized by the same forces that had wielded wrenches and dividers, snapped finely tempered blades. And now it became a club, driving the three men towards the open hatchway.

The speaker was still reiterating its warning when Evandale in his slow, stubborn retreat stumbled over the microphone. Dodging the flailing bar he picked it up.

"No man gives orders to me

aboard my own ship!" he bellowed recklessly. It was as much a defiance of the Brain as of the unknown admiral. Then the microphone was smashed from his grasp and he stumbled back with a shattered hand.

They were not pursued through the doorway. On the ladder—anxious but unable to come to their aid in that cramped space—they found the first and second pilots and two of the cadets.

"Where's Williamson?" demanded the captain.

"With the other two lads—trying to get back into the engine room. He came along to look at the big ship through the smoking room ports. And the air-tight door shut of itself."

Half sobbing, Evandale ran down the ladders—never had they seemed so long—leading aft. At the last bulkhead he found the engineer and the two boys. A pile of splintered wood was mute testimony to their futile attempts to break into the engine compartment. They must have stripped every cabin of its portable furniture.

The captain went down on his hands and knees, hammered at the door with his bare fists. He could not, he would not, relinquish his command. And he had to make her once more obedient to his will.

Forward, MacFarlane and Stannard stared at the air-tight door that had slid shut, barring access to Control.

"What now, Mac?"

"I suppose we'd better do as yon admiral says." Strangely enough, there was now almost no trace of accent in his speech; he was past excitement. "We'd better get out of this so he can blow this cow into very small pieces."

"Damned hot!" ejaculated Gwynn, mopping his brow. He walked unsteadily to the nearest bulkhead thermometer. He swore. The pointer had jumped from its normal, comfortable 18° Centigrade to 27°—and it was still rising, fast.

"Better get out," he advised MacFarlane. "She's trying to cook us now."

Without enthusiasm the navigator gave his assent. He knew that, admiral or no admiral, it was their duty to stay and fight whatever it was that had taken possession of their ship. But he knew, too, that if they stayed with *Emma* the battleship would, in all probability, hold her fire. Men had got out of the habit of murdering each other with good intentions. And *Emma* might kill them all before they could gain control—and then she would roam the spaceways as the worst menace in the history of interplanetary navigation.

"Stan!" he ordered. "Get everybody along to the lifeboat. We're getting out! The Navy can play it all their own way then!"

With Gwynn he hurried aft, bellowing "Boat Stations!" as he did so. The engineer and the two cadets needed no second bidding. They were badly shaken and badly frightened and anything was preferable to this mad ship.

But Captain Evandale remained

crouched on the deck-plates. With bleeding hands he was still hammering at the air-tight door. His face, as he turned it towards his navigator, was haggard and tear stained, almost unrecognizable. The man seemed, somehow, to have shrunk.

"We are abandoning ship, sir," said MacFarlane gently.

"But we can't." The voice was dull, flat. "We must stay."

MacFarlane looked at Gwynn. The surgeon nodded.

The navigator crouched awkwardly and then swung his right fist for Evandale's jaw. It was, necessarily, a feeble blow. But it was enough. The captain went out like a light. And then they had to half carry, half drag, the inert body up interminable ladders to the boat cradle. *Emma* was still accelerating wildly, and her frequent and erratic changes of direction created the illusion of a surface ship laboring desperately in a mountainous sea. But at last they were in the cabin of the tiny craft.

The door slid to; all was in readiness.

"Give her the gun, Stan!" ordered MacFarlane.

The first pilot's hand hovered uncertainly above the stud that would, in theory, both switch on the drive and, through a contact in the hull, open the door in *Emma's* side. Would she let them get away so easily? But there was no alternative. With rather ludicrous care he pressed the firing key. Hard or gentle pressure—it was all the same. If the boat port failed to open, their little craft would crumple itself against the unyielding plates.

But the door opened and the boat shot out into space, flung like a stone from a sling by *Emma's* wild gyrations. Briefly, terrifyingly, *Lord Nelson* loomed before them. It seemed that they must inevitably be crushed between the two ships.

Then they were clear, streaking Sunward, their eyes filled with the intolerable yet welcome radiance of the Day Star.

Minutes elapsed before they got her turned round. And then the boat swung in a great, lazy arc till the distant sun glared unheeded on their quarter. They wanted to see the finish of the strange battle. And they wanted to be on hand to be picked up by *Lord Nelson* when it was all over. Not that they were convinced that *Lord Nelson* would be the victor. They had seen too much of *Emma's* strange powers to be sure of anything. But the admiral would be free to use his guns now—he had curtly acknowledged their message to the effect that they had abandoned ship.

At first all that they could see were two distant, interlacing spirals of fire. Then the battle rolled closer and they could distinguish the ships. *Emma,* literally, was making rings round the other. Both vessels were giving an exhibition of astrobatics that would have astounded their designers.

"Why doesn't he use his guns?" It was Evandale, conscious once more and with the wildness gone

from his eyes. The responsibility was now no longer his, but lay with the unknown admiral who was fighting the first action in the history of the Federation Space Navy. "Why doesn't he use his guns and finish it?"

"He can't," answered MacFarlane shortly.

It should have been obvious, he thought. The use of Hamilton torpedoes, explosive projectiles or the deadly but inaccurate Hollister Projectors would have been suicidal at such short range. And it had always been assumed that war in Space would be fought out between ships at fantastic distances from one another.

"Why—?" began the captain again. Then—"Oh, I see."

Hard on his words came the vivid flash of *Lord Nelson's* broadside. Those in the boat caught their breath, waited to see both ships dissolve in an evanescent hell of atomic fire. But things were just as they had been, man-o'-war and mad merchantman still reeling through the intricate measures of their deadly dance.

"He's using his brains, yon admiral!" cried MacFarlane. "Solid prrojectiles for close quarrters!"

Again the great guns flashed, and yet again. So far as they could see, *Emma* had sustained no damage, although her pace seemed appreciably to have slackened. Then, without warning, she turned and fled erratically sunward. It seemed that after all she would be the death of her crew, only a craft so small and handy as the lifeboat could have avoided the onrushing destruction.

Stannard gave her hard upper starboard jet. The boat spun like a top, violent acceleration combined with centrifugal force twisting the very guts of those inside her. For fleeting instants boat and mother ship were running almost parallel at speeds that were not too greatly disproportionate. So it was that they saw that *Emma's* driving tubes were buckled and twisted, that the burnished beauty of the sleek, streamlined hull was marred by ugly gashes.

From the speaker of the boat receiver as she passed came a low, dreadful whimpering sound. She was like a hurt, hunted animal as she staggered by, and they all somehow knew that the hurt went deeper than the merely physical.

Evandale was making a peculiar choking sound. They turned to look at him. His face was streaming with tears. He twisted in his seat, shook his fist at the distant battleship, aloof and lordly, making as yet no effort to pursue.

"Go on!" he bawled, "finish her!"

"They must, captain. They *must!*" Gwynn's sympathy was evident in spite of his clipped, staccato speech. "Can't let her go. Knows too much now. Repair herself, make weapons. Hate all ships after this!"

"But didn't she hate them before?"

"No." Then—"Can't you see?"

"Look!"

Slowly, ponderously, in turrets and sponsons, swung the great guns and projectors of *Lord Nelson.* The

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guns blazed, strange, fleeting novae against the background of the eternal stars. But *Emma's* wild course made her a difficult target. Whether this was due to her distorted jets or to an instinctive attempt to evade the wrath to come they could not tell. But the first salvo missed.

A human pilot might have anticipated the automatic spotting correction and steered straight for the bursts of the huge shells, marked as they were by a luminous, coruscating blue haze. But *Emma*, like a frightened horse, sheered madly away from the danger past, straight into the jaws of the doom to come.

Not without skill Stannard jockeyed the lifeboat into the yawning port in the huge, gleaming side. They felt the jar as she settled into the cradle, then waited until their external pressure gauge showed that it was safe to open the door.

Evandale was first out, the old rule of "last into a boat, first aboard a ship" still held good. He found himself in a long, well-lighted alleyway. A spruce youngster in sublieutenant's uniform was there to receive him. The captain returned the officer's salute, acutely conscious as he did so that it was more than twenty-four hours since he had last shaved, that he had left his cap aboard *Emma*, that his braid was tarnished and that the sleeves of his old, comfortable jacket were badly frayed. It wasn't so bad for the others, he reflected, they had done time in this class of ship. But he had been too old to enter the Reserve when it was formed. To him this strange little world of gray paint and burnished metal was as alien as the yet to be reached planets of Alpha Centauri.

Over the ship's public address system came the thin, high whistle of bos'ns pipes. There was the sound of running feet as, somewhere, somebody hastened to obey the enigmatic order at the double. It was all redolent of tradition—a tradition going far back beyond the motley collection of small spacecraft that had been dignified with the name of a Navy, far beyond the first clumsy rockets roaring up to the Moon.

It was big, Evandale was obliged to admit. It was *big*—

Abruptly, he became aware that the youth was talking to him.

". . . the admiral's compliments, sir, and will you and your senior officers come with me to his flat? Brown and Leyton!"—the two midshipmen with him sprang smartly to attention—"take the other officers and the cadets to the wardroom and gunroom respectively."

"What is it going to be?" asked Evandale, joking desperately. No ordinary man seeks interviews with admirals, even in ordinary circumstances. "Ceres or the firing squad?"

"That is for the admiral to decide, sir." replied the sub, his manner icily correct.

"Who is the admiral?"

"Vice Admiral Cartwright, sir."

The captain's manner appreciably brightened. Things might have been worse—much worse. The brass hat could have been a relic

of the Space Patrol, one of those whose self-importance was in inverse ratio to the size of the ships that he had commanded in the old days. But Cartwright had come in from the Interplanetary Merchant Navy during the era of fleet expansion. True, he was a big-ship man, but he could be expected to appreciate the viewpoint of a merchant captain.

Tall and spare, the better type of priest rather than a fighting man, Cartwright was sitting before his desk when the merchant officers entered. In one of the easy-chairs was a younger, stoutish man wearing the insignia of a captain. The admiral rose to his feet. He extended his hand in welcome, but his manner was forbidding. As Evandale hastened to make introductions he cut him short.

"That is not necessary, captain. I have photostats of all your papers here."

"Master, five officers and four cadets—all aboard and accounted for, sir!" reported the sub lieutenant.

"Thank you, Bracegirdle. You may go."

"Be seated, gentlemen," said Cartwright. Then—"I need hardly say that Captain Jones and myself take a very poor view of the way in which the safety of our ship was menaced. Fortunately for all of us we were able to destroy your vessel. In fact," he permitted himself a fleeting glimmer of a smile, "I should be almost grateful to you for the first real battle practice this Service has ever experienced.

"But"—he pushed over a decanter and three glasses—"you look as though you need this before you start talking."

It was rum, sweet and smooth and potent. Evandale did not realize how near he had been to total collapse until he felt its heartening fire running through his veins. He gratefully drained his glass. Taking a deep breath, he started to talk.

Of *Emma's* past he talked, of the cross-grained character that had been built into her in the yard. Now and again Captain Jones would turn the sheaf of papers in his hand, checking the many details of her past wickedness; now and again MacFarlane and Gwynn would lend their affirmatives to their captain's narrative. Of that last, mad fight in the control room he told and of all their futile efforts to bring their ship once more under their command. Then, suddenly, the surgeon broke in.

"Missed the point!" he snapped. "Obvious, *I* thought. You mind, captain? Good. Like this, admiral—"

From worlds long dead wearily circling cold, forgotten suns drift the seeds of life. Through the vast, empty reaches of Interstellar Space they float, rudderless, mere flotsam borne by the sluggish ebb and flow of the Tides of Time, at the mercy of the cross-currents of light and gravitation. Some, after

ages of aimless wandering, fall on stony ground—into the incandescent hearts of great stars or to the surface of planets where the very environment inhibits the growth of any life or to worlds where life is already strong and tenacious enough easily to crush the tentative bridgeheads of the invaders from Outside.

Sterile of all life, save that of her crew, is a ship in Space. Just prior to her sailing every compartment, every ounce of stores or cargo, the clothing and even the bodies of her personnel, must be exposed to gases and radiations, must not be allowed to remain potential carriers of plague between the worlds.

To this sterile world, ripe for exploitation, came the seeds of life. The control room was open to the apparent emptiness of the Outside. And when it was no longer open there was warmth, and light, and—for all save one of the seeds—air. Perhaps that one, infinitesimal bundle of the Life Principle was not material. Perhaps, in the Beginning, there were no material Seeds. Just little swirls and eddies of the Life Force that, given favorable conditions, clothed themselves with fighting, eating, breeding protoplasm—Perhaps—

And so the stubborn life of this one seed became wedded to the strange, pseudolife of the Brain, with all its conditioned reflexes that served it for memories. Became wedded, too, to the dim, half-life that is built into all machines by their makers, that passes into all machines from their masters.

And the Brain became alive, and the ship became alive, and she was an alien in the world of Men.

"Don't know what she made of *us*," concluded Gwynn. "Parasites, perhaps; or something that came with the lease, like phagocytes in human body. Maybe, at the finish, cancerous growth. But she wanted rid of us. Killed us, cheerfully, if we hadn't left. But wasn't fussy."

He paused a moment. Then, reluctantly—

"Arrhenius was right after all—"

There was a long silence. Again Evandale reached for the decanter, refilled his glass with his undamaged hand. He was past caring about anything. Thoughtful, Stannard and MacFarlane stared before them with unseeing eyes. On the faces of the admiral and his captain half belief struggled with a blank incredulity. Then—

"But why should it . . . she . . . attack us?" demanded Cartwright. "What had *we* done?"

Surprisingly, the surgeon blushed a deep red. He had never, remembered the navigator, joined in the ofttimes crude and coarse shipboard discussions of life and love.

With slow deliberation, with explanation and epitaph, MacFarlane broke the heavy, embarrassed silence.

"She was ever a bitch—" he said.

THE END.

A Logic Name Joe

by WILL F. JENKINS

***Joe** was a machine, and Joe wanted to be helpful. Joe was immensely helpful. So horribly helpful he very nearly destroyed civilization with his accurate answers!*

Illustrated by Kildale

It was on the third day of August that Joe come off the assembly line, and on the fifth Laurine come into town, and that afternoon I saved civilization. That's what I figure, anyhow. Laurine is a blonde that I was crazy about once—and crazy is the word—and Joe is a logic that I have stored away down in the cellar right now. I had to pay for him because I said I busted him, and sometimes I think about turning him on and sometimes I think about taking an ax to him. Sooner or later I'm gonna do one or the other. I kinda hope it's the ax. I could use a coupla million dollars—sure! —an' Joe'd tell me how to get or make 'em. He can do plenty! But so far I've been scared to take a chance. After all, I figure I really saved civilization by turnin' him off.

The way Laurine fits in is that she makes cold shivers run up an' down my spine when I think about her. You see, I've got a wife which I acquired after I had parted from Laurine with much romantic despair. She is a reasonable good wife, and I have some kids which are hellcats but I value 'em. If I have sense enough to leave well enough alone, sooner or later I will retire on a pension an' Social Security an' spend the rest of my life fishin' contented an' lyin' about what a great guy I used to be. But there's Joe. I'm worried about Joe.

I'm a maintenance man for the Logics Company. My job is servicing logics, and I admit modestly that I am pretty good. I was serv-

icing televisions before that guy Carson invented his trick circuit that will select any of 'steenteen million other circuits—in theory there ain't no limit—and before the Logics Company hooked it into the tank-and-integrator set-up they were usin' 'em as business-machine service. They added a vision screen for speed—an' they found out they'd made logics. They were surprised an' pleased. They're still findin' out what logics will do, but everybody's got 'em.

I got Joe, after Laurine nearly got me. You know the logics set-up. You got a logic in your house. It looks like a vision receiver used to, only it's got keys instead of dials and you punch the keys for what you wanna get. It's hooked in to the tank, which has the Carson Circuit all fixed up with relays. Say you punch "Station SNAFU" on your logic. Relays in the tank take over an' whatever vision-program SNAFU is telecastin' comes on your logic's screen. Or you punch "Sally Hancock's Phone" an' the screen blinks an' sputters an' you're hooked up with the logic in her house an' if somebody answers you got a vision-phone connection. But besides that, if you punch for the weather forecast or who won today's race at Hialeah or who was mistress of the White House durin' Garfield's administration or what is PDQ and R sellin' for today, that comes on the screen too. The relays in the tank do it. The tank is a big buildin' full of all the facts in creation an' all the recorded telecasts that ever was made—an' it's hooked in with all the other tanks all over the country—an' anything you wanna know or see or hear, you punch for it an' you get it. Very convenient. Also it does math for you, an' keeps books, an' acts as consultin' chemist, physicist, astronomer an' tea-leaf reader, with a "Advice to Lovelorn" thrown in. The only think it won't do is tell you exactly what your wife meant when she said, "Oh, you think so, do you?" in that peculiar kinda voice. Logics don't work good on women. Only on things that make sense.

Logics are all right, though. They changed civilization, the highbrows tell us. All on accounta the Carson Circuit. And Joe shoulda been a perfectly normal logic, keeping some family or other from wearin' out its brains doin' the kids' homework for 'em. But somethin' went wrong in the assembly line. It was somethin' so small that precision gauges didn't measure it, but it made Joe a individual. Maybe he didn't know it at first. Or maybe, bein' logical, he figured out that if he was to show he was different from other logics they'd scrap him. Which woulda been a brilliant idea. But anyhow, he come off the assembly line, an' he went through the regular tests without anybody screamin' shrilly on findin' out what he was. And he went right on out an' was duly installed in the home of Mr. Thaddeus Korlanovitch at 119 East Seventh Street, second floor front. So far, everything was serene.

The installation happened late Saturday night. Sunday morning

the Korlanovitch kids turned him on an' seen the Kiddie Shows. Around noon their parents peeled 'em away from him an' piled 'em in the car. Then they come back into the house for the lunch they'd forgot an' one of the kids sneaked back an' they found him punchin' keys for the Kiddie Shows of the week before. They dragged him out an' went off. But they left Joe turned on.

That was noon. Nothin' happened until two in the afternoon. It was the calm before the storm. Laurine wasn't in town yet, but she was comin'. I picture Joe sittin' there all by himself, buzzing meditative. Maybe he run Kiddie Shows in the empty apartment for a while. But I think he went kinda remote-control exploring in the tank. There ain't any fact that can be said to be a fact that ain't on a data plate in some tank somewhere—unless it's one the technicians are diggin' out an' puttin' on a data plate now. Joe had plenty of material to work on. An' he musta started workin' right off the bat.

Joe ain't vicious, you understand. He ain't like one of these ambitious robots you read about that make up their minds the human race is inefficient and has got to be wiped out an' replaced by thinkin' machines. Joe's just got ambition. If you were a machine, you'd wanna work right, wouldn't you? That's Joe. He wants to work right. An' he's a logic. An' logics can do a lotta things that ain't been found out yet. So Joe, discoverin' the fact, begun to feel restless. He selects some things us dumb humans ain't thought of yet, an' begins to arrange so logics will be called on to do 'em.

That's all. That's everything. But, brother, it's enough!

Things are kinda quiet in the Maintenance Department about two in the afternoon. We are playing pinochle. Then one of the guys remembers he has to call up his wife. He goes to one of the bank of logics in Maintentnce and punches the keys for his house. The screen sputters. Then a flash comes on the screen.

"Announcing new and improved logics service! Your logic is now equipped to give you not only consultive but directive service. If you want to do something and don't know how to do it—ask your logic!"

There's a pause. A kinda expectant pause. Then, as if reluctantly, his connection comes through. His wife answers an' gives him hell for somethin' or other. He takes it an' snaps off.

"Whadda you know?" he says when he comes back. He tells us about the flash. "We shoulda been warned about that. There's gonna be a lotta complaints. Suppose a fella asks how to get ridda his wife an' the censor circuits block the question?"

Somebody melds a hundred aces an' says:

"Why not punch for it an' see what happens?"

"It's a gag, o' course. But the guy goes over. He punches keys. In theory, a censor block is gonna

come on an' the screen will say severely, "Public Policy Forbids This Service." You hafta have censor blocks or the kiddies will be askin' detailed questions about things they're too young to know. And there are other reasons. As you will see.

This fella punches, "How can I get rid of my wife?" Just for the fun of it. The screen is blank for half a second. Then comes a flash. "Service question: Is she blond or brunette?" He hollers to us an' we come look. He punches, "Blond." There's another brief pause. Then the screen says, "Hexymetacryloaminoacetine is a constituent of green shoe polish. Take home a frozen meal including dried pea soup. Color the soup with green shoe polish. It will appear to be green-pea soup, Hexymetacryloaminoacetine is a selective poison which is fatal to blond females but not to brunettes or males of any coloring. This fact has not been brought out by human experiment, but is a product of logics service. You cannot be convicted of murder. It is improbable that you will be suspected."

The screen goes blank, and we stare at each other. It's bound to be right. A logic workin' the Carson Circuit can no more make a mistake than any other kinda computin' machine. I call the tank in a hurry.

"Hey, you guys!" I yell. "Somethin's happened! Logics are givin' detailed instructions for wife-murder! Check your censor-circuits —but quick!"

That was close, I think. But little do I know. At that precise instant, over on Monroe Avenue, a drunk starts to punch for somethin' on a logic. The screen says "Announcing new and improved logics service! If you want to do something and don't know how to do it—ask your logic!" And the drunk says owlish, "I'll do it!" So he cancels his first punching and fumbles around and says: "How can I keep my wife from finding out I've been drinking?" And the screen says, prompt: "Buy a bottle of Franine hair shampoo. It is harmless but contains a detergent which will neutralize ethyl alcohol immediately. Take one teaspoonful for each jigger of hundred-proof you have consumed."

This guy was plenty plastered—just plastered enough to stagger next door and obey instructions. An' five minutes later he was cold sober and writing down the information so he couldn't forget it. It was new, and it was big! He got rich offa that memo! He patented *"SOBUH, The Drink that Makes Happy Homes!"* You can top off any souse with a slug or two of it an' go home sober as a judge. The guy's cussin' income taxes right now!

You can't kick on stuff like that. But a ambitious young fourteen-year-old wanted to buy some kid stuff and his pop wouldn't fork over. He called up a friend to tell his troubles. And his logic says: "If you want to do something and don't know how to do it—Ask your logic!" So this kid punches: "How

can I make a lotta money, fast?"

His logic comes through with the simplest, neatest, and the most efficient counterfeitin' device yet known to science. You see, all the data was in the tank. The logic —since Joe had closed some relays here an' there in the tank—simply integrated the facts. That's all. The kid got caught up with three days later, havin' already spent two thousand credits an' havin' plenty more on hand. They hadda time tellin' his counterfeits from the real stuff, an' the only way they done it was that he changed his printer, kid fashion, not bein' able to let somethin' that was workin' right alone.

Those are what you might call samples. Nobody knows all that Joe done. But there was the bank president who got humorous when his logic flashed that "Ask your logic" spiel on him, and jestingly asked how to rob his own bank. An' the logic told him, brief and explicit but good! The bank president hit the ceiling, hollering for cops. There musta been plenty of that sorta thing. There was fifty-four more robberies than usual in the next twenty-four hours, all of them planned astute an' perfect. Some of 'em they never did figure out how they'd been done. Joe, he'd gone exploring in the tank and closed some relays like a logic is supposed to do—but only when required—and blocked all censor-circuits an' fixed up this logics service which planned perfect crimes, nourishing an' attractive meals, counterfeitin' machines, an' new industries with a fine impartiality. He musta been plenty happy, Joe must. He was functionin' swell, buzzin' along to himself while the Korlanovitch kids were off ridin' with their ma an' pa.

They come back at seven o'clock, the kids all happily wore out with their afternoon of fightin' each other in the car. Their folks put 'em to bed an' sat down to rest. They saw Joe's screen flickerin' meditative from one subject to another an' old man Korlanovitch had had enough excitement for one day. He turned Joe off.

An' at that instant the pattern of relays that Joe had turned on snapped off, all the offers of directive service stopped flashin' on logic screens everywhere, an' peace descended on the earth.

For everybody else. But for me. Laurine come to town. I have often thanked God fervent that she didn't marry me when I thought I wanted her to. In the intervenin' years she had progressed. She was blond an' fatal to begin with. She had got blonder and fataler an' had had four husbands and one acquittal for homicide an' had acquired a air of enthusiasm and self-confidence. That's just a sketch of the background. Laurine was not the kinda former girl-friend you like to have turning up in the same town with your wife. But she come to town, an' Monday morning she tuned right into the middle of Joe's second spasm of activity.

The Korlanovitch kids had turned him on again. I got these details

later and kinda pieced 'em together. An' every logic in town was dutifully flashin' a notice "If you want to do something—ask your logic!" every time they were turned on for use. More'n that, when people punched for the morning news, they got a full account of the previous afternoon's doin's. Which put 'em in a frame of mind to share in the party. One bright fella demands, "How can I make a perpetual motion machine?" And his logic sputters a while an' then comes up with a set-up usin' the Brownian movement to turn little wheels. If the wheels ain't bigger'n a eighth of an inch, they'll turn, all right, an' practically it's perpetual motion. Another one asks for the secret of transmuting metals. The logic rakes back in the data plates an' integrates a strictly practical answer. It does take so much power that you can't make no profit except on radium, but that pays off good. An' from the fact that for a coupla years to come the police were turnin' up new and improved jimmies, knob-claws for gettin' at safe-innards, and all-purpose keys that'd open any known lock—why there must have been other inquirers with a strictly practical viewpoint. Joe done a lot for technical progress!

But he done more in other lines. Educational, say. None of my kids are old enough to be int'rested, but Joe by-passed all censor-circuits because they hampered the service he figured logics should give humanity. So the kids an' teen-agers who wanted to know what comes after the bees an' flowers found out. And there is certain facts which men hope their wives won't do more'n suspect, an' those facts are just what their wives are really curious about. So when a woman dials: "How can I tell if Oswald is true to me?" and her logic tells her—you can figure out how many rows got started that night when the men come home!

All this while Joe goes on buzzin' happy to himself, showin' the Korlanovitch kids the animated funnies with one circuit while with the others he remote-controls the tank so that all the other logics can give people what they ask for and thereby raise merry hell.

An' then Laurine gets onto the new service. She turns on the logic in her hotel room, prob'ly to see the week's style-forecast. But the logic says, dutiful: "If you want to do something—ask your logic!" So Laurine prob'ly looks enthusiastic—she would!—and tries to figure out something to ask. She already knows all about everything she cares about—ain't she had four husbands and shot one?—so I occur to her. She knows this is the town I live in. So she punches, "How can I find Ducky?"

O.K., guy! But that is what she used to call me. She gets a service question. "Is Ducky known by any other name?" So she gives my regular name. And the logic can't find me. Because my logic ain't listed under my name on account of I am in Maintenance and don't want to be pestered when I'm home, and

there ain't any data plates on code-listed logics, because the codes get changed so often—like a guy gets plastered an' tells a redhead to call him up, an' on gettin' sober hurriedly has the code changed before she reaches his wife on the screen.

Well! Joe is stumped. That's prob'ly the first question logics service hasn't been able to answer. "How can I locate Ducky?"!! Quite a problem! So Joe broods over it while showin' the Korlanovitch kids the animated comic about the cute little boy who carries sticks of dynamite in his hip pocket an' plays practical jokes on everybody. Then he gets the trick. Laurine's screen suddenly flashes:

"Logics special service will work upon your question. Please punch your logic designation and leave it turned on. You will be called back."

Laurine is merely mildly interested, but she punches her hotel-room number and has a drink and takes a nap. Joe sets to work. He has been given a idea.

My wife calls me at Maintenance and hollers. She is fit to be tied. She says I got to do something. She was gonna make a call to the butcher shop. Instead of the butcher or even the "If you want to do something" flash, she got a new one. The screen says, "Service question: What is your name?" She is kinda puzzled, but she punches it. The screen sputters an' then says: "Secretarial Service Demonstration! You—" It reels off her name, address, age, sex, coloring, the amounts of all her charge accounts in all the stores, my name as her husband, how much I get a week, the fact that I've been pinched three times—twice was traffic stuff, and once for a argument I got in with a guy—and the interestin' item that once when she was mad with me she left me for three weeks an' had her address changed to her folks' home. Then it says, brisk: "Logics Service will hereafter keep your personal accounts, take messages, and locate persons you may wish to get in touch with. This demonstration is to introduce the service." Then it connects her with the butcher.

But she don't want meat, then. She wants blood. She calls me.

"If it'll tell me all about myself," she says, fairly boilin', "it'll tell anybody else who punches my name! You've got to stop it!"

"Now, now, honey!" I says. "I didn't know about all this! It's new! But they musta fixed the tank so it won't give out information except to the logic where a person lives!"

"Nothing of the kind!" she tells me, furious. "I tried! And you know that Blossom woman who lives next door! She's been married three times and she's forty-two years old and she says she's only thirty! And Mrs. Hudson's had her husband arrested four times for nonsupport and once for beating her up. And—"

"Hey!" I says. "You mean the logic told you this?"

"Yes!" she wails. "It will tell anybody anything! You've got to stop it! How long will it take?"

"I'll call up the tank," I says. "It can't take long."

"Hurry!" she says, desperate, "before somebody punches my name! I'm going to see what it says about that hussy across the street."

She snaps off to gather what she can before it's stopped. So I punch for the tank and I get this new "What is your name?" flash. I got a morbid curiosity and I punch my name, and the screen says: "Were you ever called Ducky?" I blink. I ain't got no suspicions. I say, "Sure!" And the screen says, "There is a call for you."

Bingo! There's the inside of a hotel room and Laurine is reclinin' asleep on the bed. She'd been told to leave her logic turned on an' she'd done it. It is a hot day and she is trying to be cool. I would say that she oughta not suffer from the heat. Me, being human, I do not stay as cool as she looks. But there ain't no need to go into that. After I get my breath I say, "For Heaven's sake!" and she opens her eyes.

At first she looks puzzled, like she was thinking is she getting absent-minded and is this guy somebody she married lately. Then she grabs a sheet and drapes it around herself and beams at me.

"Ducky!" she says. "How marvelous!"

I say something like "Ugmph!" I am sweating.

She says:

"I put in a call for you, Ducky, and here you are! Isn't it romantic? Where are you really, Ducky? And when can you come up? You've no idea how often I've thought of you!"

I am probably the only guy she ever knew real well that she has not been married to at some time or another.

I say "Ugmph!" again, and swallow.

"Can you come up instantly?" asks Laurine brightly.

"I'm . . . workin'," I say. "I'll . . . uh . . . call you back."

"I'm terribly lonesome," says Laurine. "Please make it quick, Ducky! I'll have a drink waiting for you. Have you ever thought of me?"

"Yeah," I say, feeble. "Plenty!"

"You darling!" says Laurine. "Here's a kiss to go on with until you get here! Hurry, Ducky!"

Then I sweat! I still don't know nothing about Joe, understand. I cuss out the guys at the tank because I blame them for this. If Laurine was just another blonde—well—when it comes to ordinary blondes I can leave 'em alone or leave 'em alone, either one. A married man gets that way or else. But Laurine has a look of unquenched enthusiasm that gives a man very strange weak sensations at the back of his knees. And she'd had four husbands and shot one and got acquitted.

So I punch the keys for the tank technical room, fumbling. And the screen says: "What is your name?" but I don't want any more. I punch the name of the old guy who's stock clerk in Maintenance. And the

screen gives me some pretty interestin' dope—I never woulda thought the old fella had ever had that much pep—and winds up by mentionin' a unclaimed deposit now amountin' to two hundred eighty credits in the First National Bank, which he should look into. Then it spiels about the new secretarial service and gives me the tank at last.

I start to swear at the guy who looks at me. But he says, tired:

"Snap it off, fella. We got troubles an' you're just another. What are the logics doin' now?"

I tell him, and he laughs a hollow laugh.

"A light matter, fella," he says. "A very light matter! We just managed to clamp off all the data plates that give information on high explosives. The demand for instructions in counterfeiting is increasing minute by minute. We are also trying to shut off, by main force, the relays that hook in to data plates that just barely might give advice on the fine points of murder. So if people will only keep busy getting the goods on each other for a while, maybe we'll get a chance to stop the circuits that are shifting credit-balances from bank to bank before everybody's bankrupt except the guys who thought of askin' how to get big bank accounts in a hurry."

"Then," I says hoarse, "shut down the tank! Do somethin'!"

"Shut down the tank?" he says mirthless. "Does it occur to you, fella, that the tank has been doin' all the computin' for every business office for years? It's been handlin' the distribution of ninety-four per-cent of all telecast programs, has given out all information on weather, plane schedules, special sales, employment opportunities and news; has handled all person-to-person contacts over wires and recorded every business conversation and agreement— Listen, fella! Logics changed civilization. Logics *are* civilization! If we shut off logics, we go back to a kind of civilization we have forgotten how to run! I'm getting hysterical myself and that's why I'm talkin' like this! If my wife finds out my pay-check is thirty credits a week more than I told her and starts hunting for that redhead—"

He smiles a haggard smile at me and snaps off. And I sit down and put my head in my hands. It's true. If something had happened back in cave days and they'd hadda stop usin' fire— If they'd hadda stop usin' steam in the nineteenth century or electricity in the twentieth— It's like that. We got a very simple civilization. In the nineteen hundreds a man would have to make use of a typewriter, radio, telephone, teletypewriter, newspaper, reference library, encyclopedias, office files, directories, plus messenger service and consulting lawyers, chemists, doctors, dietitians, filing clerks, secretaries—all to put down what he wanted to remember an' to tell him what other people had put down that he wanted to know; to report what he said to somebody else and to report to him what they said back. All we have to have is logics. Anything we

want to know or see or hear, or anybody we want to talk to, we punch keys on a logic. Shut off logics and everything goes skiddoo. But Laurine—

Somethin' had happened. I still didn't know what it was. Nobody else knows, even yet. What had happened was Joe. What was the matter with him was that he wanted to work good. All this fuss he was raisin' was, actual, nothin' but stuff we shoulda thought of ourselves. Directive advice, tellin' us what we wanted to know to solve a problem, wasn't but a slight extension of logical-integrator service. Figurin' out a good way to poison a fella's wife was only different in degree from figurin' out a cube root or a guy's bank balance. It was gettin' the answer to a question. But things was goin' to pot because there was too many answers being given to too many questions.

One of the logics in Maintenance lights up. I go over, weary, to answer it. I punch the answer key. Laurine says:

"Ducky!"

It's the same hotel room. There's two glasses on the table with drinks in them. One is for me. Laurine's got on some kinda frothy hangin'-around-the-house-with-the-boyfriend outfit that automatic makes you strain your eyes to see if you actual see what you think. Laurine looks at me enthusiastic.

"Ducky!" says Laurine. "I'm lonesome! Why haven't you come up?"

"I . . . been busy," I say, strangling slightly.

"Pooh!" says Laurine. "Listen, Ducky! Do you remember how much in love we used to be?"

I gulp.

"Are you doin' anything this evening?" says Laurine.

I gulp again, because she is smiling at me in a way that a single man would maybe get dizzy, but it gives a old married man like me cold chills. When a dame looks at you possessive—

"Ducky!" says Laurine, impulsive. "I was so mean to you! Let's get married!"

Desperation gives me a voice.

"I . . . got married," I tell her, hoarse.

Laurine blinks. Then she says, courageous:

"Poor boy! But we'll get you outa that! Only it would be nice if we could be married today. Now we can only be engaged!"

"I . . . can't—"

"I'll call up your wife," says Laurine, happy, "and have a talk with her. You must have a code signal for your logic, darling. I tried to ring your house and noth—"

Click! That's my logic turned off. I turned it off. And I feel faint all over. I got nervous prostration. I got combat fatigue. I got anything you like. I got cold feet.

I beat it outa Maintenance, yellin' to somebody I got a emergency call. I'm gonna get out in a Maintenance car an' cruise around until it's plausible to go home. Then I'm gonna take the wife an' kids an'

beat it for somewheres that Laurine won't ever find me. I don't wanna be fifth in Laurine's series of husbands and maybe the second one she shoots in a moment of boredom. I got experience of blondes. I got experience of Laurine! And I'm scared to death!

I beat it out into traffic in the Maintenance car. There was a disconnected logic in the back, ready to substitute for one that hadda burned-out coil or something that it was easier to switch and fix back in the Maintenance shop. I drove crazy but automatic. It was kinda ironic, if you think of it. I was goin' hoopla over a strictly personal problem, while civilization was crackin' up all around me because other people were havin' their personal problems solved as fast as they could state 'em. It is a matter of record that part of the Mid-Western Electric research guys had been workin' on cold electron-emission for thirty years, to make vacuum tubes that wouldn't need a power source to heat the filament. And one of those fellas was intrigued by the "Ask your logic" flash. He asked how to get cold emission of electrons. And the logic integrates a few squintillion facts on the physics data plates and tells him. Just as casual as it told somebody over in the Fourth Ward how to serve left-over soup in a new attractive way, and somebody else on Mason Street how to dispose of a torso that somebody had left careless in his cellar after ceasing to use same.

Laurine wouldn't never have found me if hadn't been for this new logics service. But now that it was started—Zowie! She'd shot one husband and got acquitted. Suppose she got impatient because I was still married an' asked logics service how to get me free an' in a spot where I'd have to marry her by 8:30 p.m.? It woulda told her! Just like it told that woman out in the suburbs how to make sure her husband wouldn't run around no more. *Br-r-r-r!* An' like it told that kid how to find some buried treasure. Remember? He was happy totin' home the gold reserve of the Hanoverian Bank and Trust Company when they caught on to it. The logic had told him how to make some kinda machine that nobody has been able to figure how it works even yet, only they guess it dodges around a coupla extra dimensions. If Laurine was to start askin' questions with a technical aspect to them, that would be logics' service meat! And fella, I was scared! If you think a he-man oughtn't to be scared of just one blonde—you ain't met Laurine!

I'm drivin' blind when a social-conscious guy asks how to bring about his own particular system of social organization at once. He don't ask if it's best or if it'll work. He just wants to get it started. And the logic—or Joe—tells him! Simultaneous, there's a retired preacher asks how can the human race be cured of concupiscence. Bein' seventy, he's pretty safe himself, but he wants to remove the

peril to the spiritual welfare of the rest of us. He finds out. It involves constructin' a sort of broadcastin' station to emit a certain wave-pattern an' turnin' it on. Just that. Nothing more. It's found out afterward, when he is solicitin' funds to construct it. Fortunate, he didn't think to ask logics how to finance it, or it woulda told him that, too, an' we woulda all been cured of the impulses we maybe regret afterward but never at the time. And there's another group of serious thinkers who are sure the human race would be a lot better off if everybody went back to nature an' lived in the woods with the ants an' poison ivy. They start askin' questions about how to cause humanity to abandon cities and artificial conditions of living. They practically got the answer in logics service!

Maybe it didn't strike you serious at the time, but while I was drivin' aimless, sweatin' blood over Laurine bein' after me, the fate of civilization hung in the balance. I ain't kiddin'. For instance, the Superior Man gang that sneers at the rest of us was quietly asking questions on what kinda weapons could be made by which Superior men could take over and run things—

But I drove here an' there, sweatin' an' talkin' to myself.

"What I oughta do is ask this wacky logics service how to get outa this mess," I says. "But it'd just tell me a intricate an' foolproof way to bump Laurine off. I wanna have peace! I wanna grow comfortably old and brag to other old guys about what a hellion I used to be, without havin' to go through it an' lose my chance of livin' to be a elderly liar."

I turn a corner at random, there in the Maintenance car.

"It was a nice kinda world once," I says, bitter. "I could go home peaceful and not have belly-cramps wonderin' if a blonde has called up my wife to announce my engagement to her. I could punch keys on a logic without gazing into somebody's bedroom while she is giving her epidermis a air bath and being led to think things I gotta take out in thinkin'. I could—"

Then I groan, rememberin' that my wife, naturally, is gonna blame me for the fact that our private life ain't private any more if anybody has tried to peek into it.

"It was a swell world," I says, homesick for the dear dead days-before-yesterday. "We was playin' happy with our toys like little innocent children until somethin' happened. Like a guy named Joe come in and squashed all our mud pies."

Then it hit me. I got the whole thing in one flash. There ain't nothing in the tank set-up to start relays closin'. Relays are closed exclusive by logics, to get the information the keys are punched for. Nothin' but a logic coulda cooked up the relay patterns that constituted logics service. Humans wouldn't ha' been able to figure it out! Only a logic could integrate all the stuff that woulda made all the other logics work like this—

There was one answer. I drove into a restaurant and went over to a

pay-logic an' dropped in a coin.

"Can a logic be modified," I spell out, "to co-operate in long-term planning which human brains are too limited in scope to do?"

The screen sputters. Then it says:

"Definitely yes."

"How great will the modifications be?" I punch.

"Microscopically slight. Changes in dimensions," says the screen. "Even modern precision gauges are not exact enough to check them, however. They can only come about under present manufacturing methods by an extremely improbable accident, which has only happened once."

"How can one get hold of that one accident which can do this highly necessary work?" I punch.

The screen sputters. Sweat broke out on me. I ain't got it figured out close, yet, but what I'm scared of is that whatever is Joe will be suspicious. But what I'm askin' is strictly logical. And logics can't lie. They gotta be accurate. They can't help it.

"A complete logic capable of the work required," says the screen, "is now in ordinary family use in—"

And it gives me the Korlanovitch address and do I go over there! Do I go over there fast! I pull up the Maintenance car in front of the place, and I take the extra logic outa the back, and I stagger up to the Korlanovitch flat and I ring the bell. A kid answers the door.

"I'm from Logics Maintenance," I tell the kid. "An inspection record has shown that your logic is apt to break down any minute. I come to put in a new one before it does."

The kid says "O.K.!" real bright and runs back to the livin'-room where Joe—I got the habit of callin' him Joe later, through just meditatin' about him—is runnin' somethin' the kids wanna look at. I hook in the other logic an' turn it on, conscientious makin' sure it works. Then I say:

"Now kiddies, you punch this one for what you want. I'm gonna take the old one away before it breaks down."

And I glance at the screen. The kiddies have apparently said they wanna look at some real cannibals. So the screen is presenting a anthropological expedition scientific record film of the fertility dance of the

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Huba-Jouba tribe of West Africa. It is supposed to be restricted to anthropological professors an' post-graduate medical students. But there ain't any censor blocks workin' any more and it's on. The kids are much interested. Me, bein' a old married man, I blush.

I disconnect Joe. Careful. I turn to the other logic and punch keys for Maintenance. I do not get a services flash. I get Maintenance. I feel very good. I report that I am goin' home because I fell down a flight of steps an' hurt my leg. I add, inspired:

"An' say, I was carryin' the logic I replaced an' it's all busted. I left it for the dustman to pick up."

"If you don't turn 'em in," says Stock, "you gotta pay for 'em."

"Cheap at the price," I say.

I go home. Laurine ain't called. I put Joe down in the cellar, careful. If I turned him in, he'd be inspected an' his parts salvaged even if I busted somethin' on him. Whatever part was off-normal might be used again and everything start all over. I can't risk it. I pay for him and leave him be.

"That's what happened. You might say I saved civilization an' not be far wrong. I know I ain't goin' to take a chance on havin' Joe in action again. Not while Laurine is livin'. An' there are other reasons. With all the nuts who wanna change the world to their own line o' thinkin', an' the ones that wanna bump people off, an' generally solve their problems— Yeah! Problems are bad, but I figure I better let sleepin' problems lie.

But on the other hand, if Joe could be tamed, somehow, and got to work just reasonable—He could make me a coupla million dollars, easy. But even if I got sense enough not to get rich, an' if I get retired and just loaf around fishin' an' lyin' to other old duffers about what a great guy I used to be— Maybe I'll like it, but maybe I won't. And after all, if I get fed up with bein' old and confined strictly to thinking—why I could hook Joe in long enough to ask: "How can a old guy not stay old?" Joe'll be able to find out. An' he'll tell me.

That couldn't be allowed out general, of course. You gotta make room for kids to grow up. But it's a pretty good world, now Joe's turned off. Maybe I'll turn him on long enough to learn how to stay in it. But on the other hand, maybe—

THE END.

IN TIMES TO COME

Next month brings Part Two of George Smith's "Pattern for Conquest"; at the ending this month, the pattern has not yet developed. The item concerning fungus growths native to Earth in Part One is the outgrowth of a radio design engineer's sad experiences with what our own lowly life-forms can thrive on and consider healthful breakfast food. Smith has also made it a take-off point for a science-fiction yarn—but his particular use of it will, I think, pull a double-take on you—

The OPA is largely out of business now—for which the Lord be thanked, but also the OPA. They did a necessary job, even if nobody liked it. Raymond F. Jones has a story coming up, though, called "Black Market," in which the OPA, in the person of one particular OPA agent, encounters a type of violation that required some highly specialized handling. A crossroads store that advertised itself as a black market, offered unrationed tires, tubes, gasoline, washing machines—everything. And such ingenious washers, too. With such curiously ingenious engineering principles—like nothing ever seen on Earth before—

Matter of fact, nothing like those washers—or the tires, either, for that matter—*had* existed or been manufactured on Earth before. Which was why that black market required something more than the rule-book in its handling.

THE EDITOR.

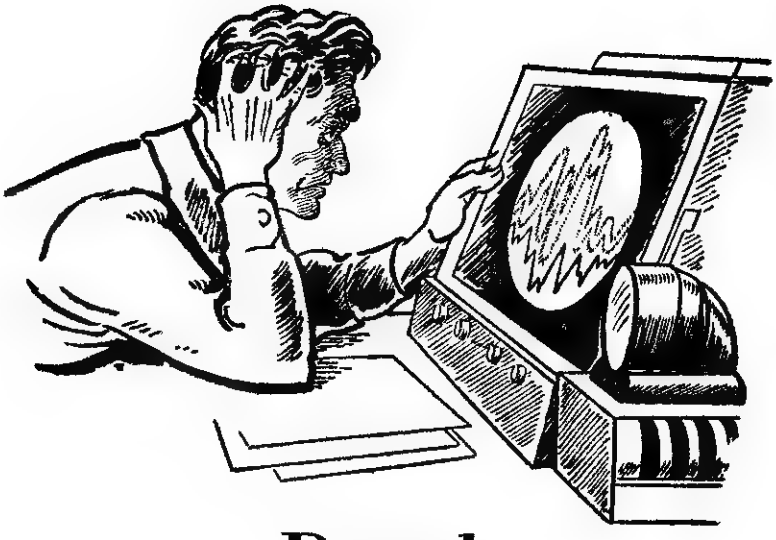
THE ANALYTICAL LABORATORY

The Lab this month is being prepared a little bit earlier than I'd like; the number of votes is smaller than it should be. Most of our regular voters, I suspect, are involved with Christmas cards and shopping instead of A.S.F. votes. The scores listed below are provisional, therefore; if later returns make any important shifts, the shift will be recorded next issue.

At present, the main battle for position seems to be between Padgett's "Beggars in Velvet" and Asimov's "Mule." The length of the stories cut down their number to four—plus the excerpt from the Smyth Report on Atomic Energy.

Place	Story	Author	Points
1.	Beggars In Velvet	Lewis Padgett	1.4
2.	The Mule (Pt. 2.)	Isaac Asimov	1.8
3.	Trouble Times Two	George O. Smith	2.8
4.	Orders	Malcolm Jameson	4.0

THE EDITOR.



Depth

by G. N. HOWARD

A new author presents a new picture of a ship of—not space, yet space for all that. But the space hundreds of miles within the Earth!

Illustrated by Williams

PROLOGUE

Across the awful gulfs of deep space, the Emissaries had tracked him. They had traced the tiny ripples that He had left in the subether—their swift strides overhauled His weakening progress with terrible inexorability. As the pursuers drew close, He realized that the end was near. For the final stand He had chosen His own battleground: a medium-sized galaxy with straggling spiral arms. Shrouded in a great stratum of dark obscuring dust, He waited for them to close.

The titanic struggle—the greatest in all time—was fought in subspace, else the galaxy would have been annihilated in the interplay of immense forces, but enough leaked through into prime-space to shear off a portion of a spiral arm and send its shattered remnants swirling tangentially off, eventually to coalesce as two masses in orbital motion about the parent system. When His defenses had been smashed, when the vast energy fields had been withdrawn, when the thousands of ruptured suns had died out, the Emissaries held Him help-

ess. But since a Being cannot be destroyed, they could only strip Him of His powers and His weapons. Nearby lay a small star, slightly damaged in the great struggle: struck a glancing blow, a splash of incandescent gases had been flung out from it. The glowing filament had already begun to cool and condense when a small section of it underwent a subtle transformation.

The Emissaries turned homeward, leaving the fugitive helplessly, insentiently imprisoned, but not unwatched.

The *Emerald*, the old lady of Subcontinental's Los Angeles-Calcutta run, was about a thousand miles down, somewhere under the Indonesian Shield, when the engineer was summoned by the operations integrator. The trouble was in the Mackensen maintenance somewhere; as he scanned the weak, uncertain flutterings of the Mac residual potential on the operations tracing, the engineer inwardly damned the fussiness of the mass of quartz and metal that was the integrator. He was new on the Asian run: a transfer from Canada Quadrant, where one becomes hardened to the weird behavior of Mac fields in flux eddies beneath the magnetic pole. He settled himself resignedly before the stereo. It was a matter of minutes for his mechos to trace the difficulty to the ion shunts. As the *Emerald* slipped through the fluctuating densities of the middle bathysphere, the Mackensens sometimes daintily gnawed, sometimes avidly gulped at their power supply, in order to maintain the proper field strength. When the depth freighter entered a negative density gradient, the back-surge across the Mackensens was drained off and returned to Power Sector. The actual handling of input and output was the function of the triple banks of ion shunts. Although capable of controlling the field maintenance of a twenty-million-ton freighter, their response was of the swiftness of a Coulomb field: far faster than the old outmoded electronic relays which had held back depth navigation for so long, and whose operation was limited by the velocity of light.

The trouble was in the shunts, undoubtedly, or possibly in one of the trigger switches they operated. The engineer watched as the swift little repair robots went down the line of shunts, testing and inspecting with bewildering speed. It took only a short time for them to find the trouble—the engineer saw that a complete replacement was needed. A spare assembly was immediately brought up, and the repair crew asked for permission to disconnect the shunt bank from the drain and maintenance circuits. He hestitated for a moment. The irregular nature of the territory they were now penetrating made it risky to trust the Macs to a double bank of shunts; he therefore ordered the robots to leave the remainder of the bank in circuit, but cut out the defective position while the replacement was under way. Thick tantalum-silver cables appeared, and shorted the position out of the circuit. It was

at that instant that disaster struck —the first accident in Subcontinental's three centuries of matrix navigation.

For an hour, the *Emerald* had been penetrating a great ferrous-basalt peninsula that jutted downward from the main mass of the Indonesian Shield. Suddenly, without warning, she broke out into the lighter surrounding rock. A terrific back-surge of energy poured back through the Mackensens; the primary shunt bank broke the feed circuits and opened the conduits to Power Sector. The torrent of energy leaped through the thick tantalum-silver cables, but as they began to overheat dangerously, emergency shunts diverted the back-surge into waste cyclotrons, where it went harmlessly to work smashing at nitrogen nuclei. But—all this happened in a hundred-thousandth of a second—the cascade of pure energy, drained from the field of the *Emerald,* which had been built up by the Mackensens over many minutes, swelled to an inconceivable flood of destruction. It leaped to the secondary shunt bank, and the temporary cut-out cable gave way. With one hellish flash, the tantalum-silver was vaporized, ionized, and the irresistible onrush of energy leaped into the midst of the robot repair crew.

The engineer, watching at his stereo, saw nothing but one blinding flash before the transmitter was annihilated. A glance at the constellation of pilot lights that sprang into life on his panel told the rest: the surge had arced into Field Maintenance Sector, and from the number of circuits that were dead, had apparently wrecked the place. Safety shunts had diverted the remainder of the energy to outside ground, which was patently necessary to avoid disaster, although it played havoc with the Mackensen field.

In Control Sector, the emergencies had cut out the autonavigator and brought the enormous, stricken bulk of the *Emerald* to a halt. Obviously, it would be suicidal to proceed without means for maintaining her field. The delicately balanced Mackensen field that made it possible for her to slip through the densest rocks, as one impalpable cloud through another, must be maintained carefully or internal friction between the molecules of the ship and of the massive rocks through which she passed would cause overheating, and if carried to a sufficient degree, explosion. Old Wilbur Mackensen, although his field had defied the ancient law that two bodies cannot occupy the same space at the same time by making the molecules alternately mutually repulsive so that one body slid smoothly through another, had been unable to retain the forces of cohesion. Only when the polarized interlock matrix had been devised did penetration become possible. Although the swifter air and surface craft were generally preferred for personal transportation, the bulk of the heavy freight of the planet was hauled through the bowels of old Mother Earth by the great freighters of Subcontinental Transportation Corporation.

Erik Palmer knew from the faces of the men in Control Sector that the trouble was of no minor nature. He stood behind the silent group as the engineers stereoed back their report. The technicalities of the report droned unheard past his ears, but the glowing, hissing inferno that was Field Maintenance, as miniatured in the stereo, spoke for itself. He could almost feel the terrific heat, as, fascinated, he watched the insulated robots grope in the hellish flare among the fused, shapeless masses that had been the complex mechanisms that meant so much to the *Emerald*. He jerked back to awareness.

"Mr. Palmer," the commander said again, sharply.

"Uh . . . yes, sir," he answered, suddenly conscious of a ring of white faces about him.

"I realize, of course, that your being a visitor aboard gives me no official command of your activities other than those duties to be expected of such a visitor, but in this emergency I feel that it is necessary that I ask you to give us all assistance."

"Of course, commander, although I'm afraid my abilities won't be of much use to you in a fix like this."

"On the contrary," replied the commander. "This accident has made it impossible for us to use the regular stereo communicators to call the surface. The Mackensen fields are very delicately balanced by the emergency maintenance rigs, whose workable range is too small to risk inducing any secondary effects by sending signals with enough power to raise Saigon." Glancing about him, "I need not remind you gentlemen of what would happen if those emergency rigs couldn't handle any sudden fluctuation."

Erik Palmer was suddenly conscious of the crushing weight of a quarter of Terra's radius hanging above them. If the emergencies gave up their struggle, the *Emerald* and her crew would be just a wiggle on the seismograms of a few Asian observatories. The little group stared at the commander in the tense, almost tangible silence. Unnaturally pale, drawn features marked Commander Feris as one who had spent years in the depths. He was not an old man, but one does not live in the insidious grip of Mac fields for half one's life without having premature old age creep into one. The human organism was not designed to operate where the fields made membranes slightly porous, the walls of ductless glands a trifle too permeable, the vapor pressure of body fluids a little too high. Although the biological problems of Mackensen travel had been pretty well ironed out since the first ghastly incidents of the pioneers, in time the fields left their mark.

"However," continued Feris, "we have the regulation low-wattage emergency seismophone equipment, but"—glancing about him— "I'm afraid that none of us know anything about such an obsolete technique. After all," Feris laughed

harshly, "we have the dubious distinction of having in our laps the first major depth accident in three hundred years. If this weren't such an old boat, we probably wouldn't have even the seismic transmitter. Do you think you could operate it, Palmer?"

Erik shrugged. "I suppose that I could figure it out, although my training lies in another direction. Is there any particular hurry?"

Feris hesitated, then shook his head. "We'd better go have a look at the thing now, though." He turned over control of the ship to the executive officer. Palmer watched as he set the intership teleport and followed him through the shimmering screen.

The little white-walled room was packed with rather alien equipment, but Palmer's trained eye traced out the operating principles in a few minutes. As he broke the panel seals, he marveled at the date; except for the routine checks, the set had not been operated since the *Emerald* was launched.

Feris had watched in silence, but when he seated himself in the operating chair, the commander said: "I'm afraid that I was forced to lie to you back there, Mr. Palmer, for the benefit of our audience. It *is* urgent, terribly urgent, that we get relief as soon as possible. The drive is off and we are settling rather rapidly. Unless Maintenance Sector can be put back into partial operation, I'm afraid that we are in for it. The emergencies are not designed to operate below twelve hundred miles, and with the gradient we're in, it'll not take long for us to settle that far."

Something in Erik Palmer's stomach knotted up convulsively. He stared at the commander. Although aware of the gravity of the situation when Maintenance failed, he had not suspected that it could develop into such a desperate affair. He turned swiftly to the seismophone, new resolution in every movement. As he tuned slowly across the audio spectrum, the speaker seemed to echo the very silence of the abyss—only an occasional snap of static pierced the low background mutter.

"What's that murmuring sound?" asked Feris suddenly.

Palmer looked up from the panel. "Just the diastrophic noises from the Shield. There are potential mountain ranges being built up there, you know."

He continued the exploration, until suddenly the silence was broken by the hiss of a seismic beacon. Palmer identified the wave pattern on the oscillograph screen: Calcutta III, 800 miles down. A few other automatic beacons were all that he could find. He grinned mirthlessly up at Feris:

"We could get seismic fixes with this thing, if necessary, but it looks as though no one's transmitting on sonic frequencies at all. I only hope that there's a receiver open somewhere within range."

He set up the *Emerald's* code wave pattern for emergencies, and started the automatic broadcaster. Feris stared unseeing at the wall as he said, "I wonder if the Govern-

ment stations still keep an ear on the audio band, or if there are too few old boats with seismophones still in service to make it worth their while."

Palmer did not reply, but as the minutes passed and the silence deepened, the two of them knew the answer.

For what must have been the five-hundredth time, Erik Palmer glanced resignedly across the room at the pilot light which would burn if any answering seismic signal was received on the emergency wave length. For twelve hours, the *Emerald's* transmitter had been calling vainly into the blackness and silence of the planet's bowels with no reply. The pilot remained dark. In desperation, after eight hours of helpless waiting, while the engineers worked frantically among the tangled wreckage of Maintenance Sector, and the *Emerald* sank further and further into the interior of the Earth, Feris had ordered a weak distress call sent out on the stereo. Even as the first carrier wave was built up, alarm lights blinked and the safeties killed the transmitter power. It was an even whiter-faced Feris who examined the potential tracings after that incident. Despite the frantic efforts of the emergency rigs to hold it down, the jagged graph had leaped perilously close to the red line that would mean oblivion to the *Emerald*. As Palmer's eyes turned wearily to an unending inspection of the gray metal wall opposite his bucket seat, he noticed with annoyance a weak halo around each of the tiny lights on the control panel. He rubbed tired eyes with the back of his hand—the tablets Feris had given him had swept away muscular weariness, but his eyes and mind were tired beyond the relaxing powers of any neo-alkaloid. He looked again and frowned. The faint halos still ringed the lights. He blinked, closed one eye, and then the other; the rings remained. He swerved around.

"Commander."

Feris was bent over the stereo-chart screen. He turned slowly, and Palmer was shocked to see how drawn his face was and how dull the deep-set eyes.

"Sir, am I going to pieces, or *are* there faint halation rings about the brightest lights on the panel there?"

Palmer thought that Feris would never turn away from the panel—he could have counted to a hundred as the gaunt figure stared at the lights in silence. It was not until then that Palmer realized how terrible the silence had become; the almost subsonic murmur of Power Sector was the only sound. The silence was thick and cottony. When Feris' voice broke the oppressive quiet, he sounded far away.

"No, Mr. Palmer," he said slowly, "you are not seeing things. The halos are there." He settled into a seat and absently ran thin fingers through his hair. His eyes flickered up to meet Palmer's slightly puzzled stare. "I suppose you've heard of Helmut and the *Achean?*"

"Why, yes," said Palmer, "as a

matter of fact his son was in my class at Tech. Didn't he get the *Achean* down deeper than any other ship has been since?"

"Well, perhaps others have gotten deeper, but they haven't been able to break surface again. The man was either lucky, or capable of miracles, because he dragged the *Achean* back up from eighteen hundred miles. I got to know him rather well when we were both working out of Calcutta, and managed to get him to talk a little about it. You know, Subcontinental hushed it up as much as they could, because such things aren't good for insurance rates, but they never did announce **just** why he got so far down. I always suspected that the Dutch idiot did it just for the sake of the depth record, although he had some sort of a story about the autopilot going off." Feris made a harsh sound that might have been intended for a laugh. "At any rate, at about sixteen hundred or seventeen hundred miles, he began to see these halos—all over the ship, around any bright light. They're the first symptoms of field failure, diffraction by molecules with high molecular weight in material whose density is getting uncomfortably high for the Mac potential."

"But, commander," cried Palmer, "we can maintain a high *constant* potential, can't we? I understood it was just the maintenance controls that were shot."

"Yes, our ability to generate high potentials across the Macs isn't affected, but the density-stability factor goes up exponentially with the potential. We're something like a man balancing a cone by its tip, as someone piles high explosives on the top. The thing oscillates more wildly and his efforts get more frantically desperate as more and more is piled on. We shall simply have to make our best compromise between risking our necks with the emergency maintenance rig and risking our necks by keeping the field potential down to an absolute minimum."

There was a silence.

"I hadn't realized we were down so far," admitted the commander. "I imagine the next step will be a brightening of the halos and the atmosphere will start to get milky."

"The temperature will begin to rise, too, I suppose," mused Palmer, half to himself. "The refrigerating system can cope with external heat, but this internal molecule-on-molecule friction will work everywhere. We'll have our body temperature going up, also."

Feris did not reply for several minutes, but finally raised himself from the seat. He glanced at Palmer. "I'm going to see how things are going in Maintenance Sector, and let the crew in on all the story of what we're up against. I'd suggest, Mr. Palmer, that you find something to keep you a little more busy than inspection of that wall. Didn't the Geophysical Institute send you along on this run to gather data of some sort? It would strike me that this is a golden opportunity to collect information about conditions down here that is certainly

accessible to no one else." As the two of them departed Control Sector in opposite directions, neither mentioned the unspoken rejoinder uppermost in both minds—there was an increasingly good chance that said information would never get back to the surface.

In the pimple on the *Emerald's* flank that was the emergency port where his equipment was installed, Erik Palmer tried to lose himself in an inspection of the battery of instruments which covered the floor and walls. The Institute's equipment was entirely self-recording and usually required no attention during transit, but Palmer had gone along on this trip as more or less of a joy ride, with the excuse of checking the operation of his newly designed high-resolution spectro-radiometer. Some joy ride, he reflected bitterly, as he absently spun through the spools of tracings that his instrument had already turned out. Side by side, there were recordings of the spectral-energy distribution from the hard X rays up to the Hertzian region, at ten different levels of excitation, and the electron scatter patterns of the rocks through which the *Emerald* had passed.

Palmer suddenly realized that he was staring blankly, unseeing, at the records, his mind anywhere but on the fine black lines that zigzagged along the thin strip of translucent parchflex. He shook himself mentally, and focused his eyes back on the tracings with a conscious effort. He stared at the section unrolled before him. Amid the maze of steep-sided peaks that were the usual weak background of faint emission lines to be expected in the ultraviolet, a few mammoth lines reared their flat-topped heads. What caught his attention were the ripples in the tracing along the plateaulike contour of the center of one of the lines. He checked the wave length and the term designation of the line: it was the strong resonance line of neutral manganese at 2794, angstroms, arising from the $3d^5\ 4s^2\ ^6S\text{-}3d^5\ 4s\ 4p\ ^6D^0$ transition. But there was something vaguely wrong with its hyperfine structure. After a moment's thought, he took a thick volume from a drawer and leafed thoughtfully through it. Sure enough, the hyperfine intensities *were* off.

When Feris bent over his shoulder, an hour later, the tiny desk was strewn with crumpled masses of parchflex and sheets crawling with diagrams and symbols foreign to the commander's eye.

"I see you've managed to keep yourself occupied."

Palmer started, not having heard the hum of the teleport. He thumped his forehead with the heel of his hand. "With a vengeance, commander. These tracings are enough to . . . what's the matter?" He knew what the matter was from the look on Feris' face.

"It looks as though the situation is hopeless, Mr. Palmer," said the commander quietly. "Maintenance Sector cannot be even jury-rigged in less than fifty hours. In ten hours we shall be three thousand miles

down, in densities of better than ten. At the present time, we are having difficulty stabilizing the field at a density of four and a half."

Erik Palmer could say nothing. In a curious mood of introspection, he tried to analyze his feelings as he realized that certain and inevitable death had crept very near the *Emerald*. He was not afraid, but a great dull feeling of utter helplessness nearly made tears rise to his eyes. *What* could any of them do as Mother Earth dragged them closer and closer to her bosom? He felt sticky perspiration in his palms. He looked up suddenly—that was no way to behave. Feris was watching him.

"I know precisely how you feel, Palmer. It's the cursed feeling of helplessness that affects me. If I could do something personally . . . but the only men that can help us now are the engineers. They know how desperately vital those repairs are, and they're sweating blood to put the Sector back into some sort of operating condition, but it's no trifling job. I was really appalled to see the mess that the back-surge made of the shunt banks, not to speak of the control equipment that they operated."

Feris found himself a seat in the corner of the little cubicle; he somehow felt more comfortable here than in the taut silence of Control Sector. Besides, what was there to do there? Nothing but pace the elastic metal plates, and wait. He looked across the room at Palmer. The faint halos around the illumination panels had become shimmering bands, reddish on the outer edge, bluish on the inner. The room was misty and the opposite wall, where Palmer sat, seemed hazy and indistinct. Feris tried to ignore this as he said:

"I see you've managed to find some interest in your work. Anything exciting?"

Palmer suddenly became aware of the desk strewn with parchflex. "Yes . . . the most peculiar thing shows up in these spectrum tracings." He unwound a spool and held it up for the commander to see. "This black line is simply a graph of the distribution of energy with wave length in the spectrum of the material that we happen to be penetrating at the time. There's an exciter mounted between a pair of small Mackensen coils which neutralizes the *Emerald's* field just enough to produce atomic excitation by frictional processes. As it's working now, every thirty seconds we're taking the complete spectrum from 0.5 angstroms up to about a centimeter wave length, at ten levels of excitation, from practically zero for the long-wave metallic molecular bands up to around 1000 electron-volts to tickle the core electrons in some of the complex atoms."

He indicated the strong line with the tiny waves across the top. "This line is a perfectly ordinary one, produced by neutral manganese, of which there is plenty down here. The little ripples running across it show that it is not a single line, but is actually composed of a series of weak ones, very close together, which aren't completely resolved

with the low dispersion that we're using in this spectrograph. Such a structure is quite well-known, and we understand perfectly what causes it. It is produced mainly by the quantization of the energy of the nuclear spin, and the effect of the presence of any isotopes. There are also effects produced by the precession of the axis of rotation of the nucleus, the mutual electrostatic perturbations of the nuclear protons and the relativity-mass changes due to the neutrons' gravitational potential, but those are usually second-order stuff." He smiled at Feris. "The trouble is that, although all this has been perfectly understood for centuries, and is predictable with great precision for any line of any atom, the structure of this line, as well as of hundreds of others of all wave lengths, is utterly anomalous in terms of our knowledge of quantum mechanics and nuclear statistics."

"Anomalous in what way?"

"Well, you see, we know all the numbers of degrees of freedom which the energy-carrying particles of an atom can have. On the basis of this knowledge we can predict just what spectral lines will be emitted by exciting the atom in various ways. The thing that's important is that all of these energy changes must be consistent with the behavior of the atom in every possible manner. This peculiar hyperfine structure that I've run into here is as abnormal and incredible in its way as if a minus sign suddenly appeared in the law of gravitation, or if the commutative law for positive integers abruptly failed to hold."

Feris looked at the tracings again, and almost had difficulty in suppressing a smile. It seemed to him that a few extra wiggles of the black line were pretty small things to get excited about in their present situation. Still, the discussion was probably just as profitable as anything either of them could manage for the moment.

"Well," he said, "isn't it quite possible that the conditions of tem-

perature and pressure down here have mutilated the atoms in some way so the hyperfine structure is modified?"

Palmer shook his head impatiently. "No, that's quite impossible. Any pressure effects that we'd encounter would just change the profiles of the individual lines a bit; temperature'd just raise the level of ionization a little, but the pressure would probably push it back down, so that there would be very little net effect. The peculiar thing here is that there are *new* lines present in the hyperfine structure. Forbidden lines are nothing new of course—such lines show up under conditions that we can't easily duplicate in a laboratory, but their positions and intensities are perfectly predictable on the basis of the known structure of the atom. These lines are in positions where no strange quirk of quantum mechanics could possibly have put them."

He ruffled through the sheets of parchflex and extracted one. "A funny part of the thing is that the structure gets weirder and weirder as you go up the periodic table. I've listed here all the elements involved—the effect seems to start weakly with manganese, iron, and cobalt, all with atomic number less than 30. It builds up gradually to iridium and platinum; their hyperfine structure looks like a spectroscopist's nightmare. For some reason, all the radioactive elements are perfectly normal, but the stable isoneutronic elements of number 97 and above are hashed up so that it's hard to recognize them."

"Could it be possible," said Feris, "that the relative abundance of the isotopes of the various elements aren't the same here as they are at the surface, so that all you're getting is an isotope effect, like you mentioned?"

"I'm afraid not," replied Palmer. "The isotope effect is easily recognizable; this is utterly unlike anything that's ever been observed before."

He stared very hard at the wall as he spoke. "You see, this is the problem. The only way an atom can emit a spectrum line is to change its energy in some way. The only way it can hold energy is to have some sort of latent way of concealing it in a mode of motion, such as rotation of the nucleus or of the orbital electrons, or in the motions of the electrons. The difficulty is that every mode of motion that the components of an atom can conceivably possess has been classified."

Palmer turned suddenly to face Feris. "The only way that these extra lines could be produced is by the *artificial incorporation of a tiny amount of extra energy into the nuclei of the atoms.*"

Not a muscle moved in Feris' face. After a moment of silence: "Artificial did you say?"

"Yes," snapped the answer, for Palmer sensed that Feris had smothered a smile. "It can be done, I'm sure. It's been almost twenty years now since Jacossen showed that it was possible to induce submultiple quantized energy levels in the movements of orbital

electrons." Palmer smiled crookedly. "Of course, he had only a finite amount of power available, so could just manipulate a few of the lighter elements. Anyway, the subquanta coalesced and left the atom as X ray photons as soon as he quit pouring on the juice. So, although I shrink from predicting the energy necessary to operate on a manganese nucleus, it's not impossible in principle."

Feris tossed his hand. "I'm not concerned with the mechanics of the thing, Palmer. You used the word *artificial*. By that do you mean that you think this is the result of some human agency?"

"Possibly. I am willing to guarantee that it has not come about through any natural process. Now just a minute"—the commander had tried to interrupt—"I know that you're going to say again that such things as mutilated nuclei might be expected to occur down here in the interior where conditions are so extreme. You might conceivably have an argument if this were the Jacossen effect in hydrogen, although I'll be blasted if I can see where the energy would come from, even there. But remember, commander, this is a nuclear effect! No combination of temperature or pressure that you can dream up inside a body of planetary size is enough to do this to *nuclei*." Palmer hesitated. "About the only guess I can make is that the Mac field does funny things at these densities. Although why then doesn't it do the same things to the *Emerald's* hull? I've tested that, but the metal is perfectly normal."

Feris looked at the small fused patch of metal on the bulkhead and smiled wryly. "This is very interesting, Palmer, but don't you think that the whole thing is rather, well, academic? If you can think of some way that it can benefit us in our present fix, I'll be delighted to abase myself before the altar of pure Science, but—" He shrugged.

Palmer was not listening. He was staring again at his diagrams. Half to himself; "If I could only understand what's holding up this utterly unnatural energy structure. It can't conceivably be under equilibrium. The spacings violate half the quantum rules in the book." He looked up suddenly. "Commander, can you haul me in a sample of this stuff we're passing through?"

"I suppose so, if you'll be satisfied with a small chunk. We can't depolarize the field very much."

Palmer peered eagerly over Feris' shoulder at the temperature indicator. The blasts of icy air had cooled their catch sufficiently, and the thick metal sampling cartridge slid out smoothly at the touch of a stud. With the sudden removal of the pressure of twenty-five hundred miles of metal and rock, the sample had exploded into a shattered double-handful of black rock with a brilliant metallic sheen. It was a matter of minutes before the spectrograph had spewed out another roll of tracings.

"Identical," muttered Palmer as he spun through the tape. "Absolutely the same. You see, this elimi-

nates any explanation on the basis of depth or pressure or anything like that. The stuff's the same under surface conditions." He went farther along the record and frowned in puzzlement, and looked at Feris. As he spoke, he tried to ignore the thick iridescent mist that seemed to fill the room; the commander was almost lost in the milky, almost luminous haze. The cubicle was uncomfortably hot.

"I would certainly expect that anything as unnatural and as . . . well, artificial, if you don't mind, as this nuclear structure wouldn't stand up under very much excitation. But it's amazing the amount of energy necessary to get it to break down."

Feris said nothing as he went on: "The test of whether this thing is an enforced consequence of the environment is whether the atoms will recover if the structure is broken down."

Palmer crossed the room and fumbled about in the baffling haze for something in his equipment.

"What are you going to do?" asked Feris.

"I'm going to give some of this stuff a right smart jolt," was the answer. "I have here a very similar gadget to the exciter on the spectrograph, but with more capacity, and a very accurate excitation control. I am now setting . . . this . . . vernier . . . there!" He straightened up "I've just set the excitation at a level to break down the strange structure in a manganese nucleus, without damaging the rest of the nucleus Luckily, it's the lowest energy level; so it'll be easy to de-excite."

"But how about the other elements?" queried Feris. "There are others that have this same funny business, aren't there?"

"Sure," replied Palmer as he worked rapidly. "Some of the lighter ones will get roughly handled, while the heavier ones won't be bothered very much. But there'll be plenty of free electrons and neutrons flying around, so all normal atoms and nuclei will build themselves back up again." He dropped a tiny grain of the rock into the cup of the lower electrode, closed the case, and pumped down the excitation chamber. He hesitated in thought for a few seconds, then jabbed a button. A split instant after the flare of the spark behind the thick window, the illumination panels went out and left them in thick darkness. There was a thump as Feris ran into the very solid barrier of the dead teleport. He cursed viciously in the darkness and then Palmer heard his fumbling hands find the little-used door and jerk it open. The sound of his running feet faded up the long corridor outside the compartment. Palmer had no intention of following him to Control; he stood in the hot blackness and frowned in the general direction of the exciter. Had its puny discharge been enough to knock out the electrical system of a craft of this size? Ridiculous, and yet, the power failure had followed instantly on the heels of the spark.

He was still there when minutes

later, Feris' haloed light flickered in *the doorway.*

"Come out here," said the commander grimly. "I want you to see something."

Palmer stared blankly at the electrical panel which guarded the circuits of the forward starboard octant of the *Emerald.* It blazed with a double row of scarlet warning lights; every miniature ion shunt on the panel had not only broken circuit, but had flicked over to outside ground.

"All right, Mr. Palmer," gritted Feris, "just explain this to me. The juice that killed these circuits was flowing *towards* Power Sector, not being drawn out of it!"

There in the hot corridor, with the brilliant beam of the hand lamp glaring back from the shiny metal, Erik Palmer felt the skin shrivel along his spinal column. He peered at the panel.

"Two hundred amp shunts? And you mean that all that going to ground didn't kick your emergency field maintenance out of this world?"

Feris laughed harshly. "You explain it." His fingers raced up the panel and the corridor was flooded again with milky, iridescent light. "What did you do to that speck of rock to make it kick back like that?"

"Nothing I hadn't already done on a very much smaller scale with the exciter on the spectrograph," muttered Palmer, as he stared into space in intense concentration.

The explanation must be that the strange energy levels were dangerously unstable and had dumped *their quanta instantaneously as the* level of excitation went past the critical point. But a spark of the sort in the exciter was hellishly inefficient; it would be remarkable if more than one out of a million million manganese nuclei could have encountered quanta of the proper energy to knock down the structure like a house of cards. But all that energy could only have come from a majority of the nuclei. Palmer felt his jaw thoughtfully. If some sort of resonance process has operated, so that all the nuclei went down like a row of dominoes, why hadn't the energy going to ground set off all the manganese nuclei down here in the center of the Earth with a bang that would have blown the planet to dust? And why hadn't the spectrograph exciter kicked back like this? "I'd like to see your field tracings—perhaps this business may not be so abstract after all."

Feris ignored the dig, and in seconds they were in Control. As he spun through the roll of graphs of the Mac potential, Palmer could not but notice how, hour by hour, the wanderings of the jagged line had become wilder and greater in amplitude as Maintenance fought its losing battle with the field.

"What would happen, commander, if you put on the drive and we started up?"

Feris stared at him in amazement. "We'd probably go fine for a few minutes until we hit a soft spot. Then the Macs would flood back through the emergency shunts, and

something would give up. Blooey. I thought you understood—"

Palmer interrupted. "What would happen, then, if instead of letting the drains pull the back-surge off the Macs and sending it to Maintenance, you simply grounded it?"

"It might work the first time if it was done very, very carefully, by pre-setting the maintenance shunts, but the loss of that much juice several times would probably not leave us with enough reserve to get through a hard spot. If atomics could work in a Mac field, it wouldn't make any difference, but we're utterly helpless as far as building up any more reserve than we took on in California. Ordinarily, we'd expect about five percent energy loss on this trip, although the field is theoretically one hundred percent efficient in a surface-to-surface cycle. Even so, if we lost as little as fifteen percent, it would be mighty close sailing. But the main thing is that all that energy diffusing out to ground would most likely puncture the field and we'd go out like a light."

Palmer was sketching a rough diagram on a parchflex sheet. "Let's say we built up a gadget like this —it's nothing more than a big edition of the exciter that I used in our funny little experiment—and hooked it up to the Mac drains, filled with a few hundred cubic feet of this metallic stuff from outside, and grounded it. What's your guess on what'd happen when a back-surge came through there?"

Feris laughed dryly. "Do you need me to answer that? There'd be a flood of juice out of there that would make a nova look feeble. I hate to think what would happen to this poor old boat; she'd probably be scattered from here to Saigon."

Palmer shook his head. "I don't think so. If a couple of million coulombs didn't even make the potential wiggle, I suspect that there's something operating that will keep a mighty lot of juice under control. Anyway we're not going to throw it all away." He turned over the sheet and sketched swiftly. "It'll be a simple matter to rig the shunts so that they'll drain only the juice they can handle from that going to ground. That way, there'll be no net loss if we're careful."

Feris shook his head slowly. "I don't think that our fix is so desperate that we should try something that looks like sheer suicide to me. I'm sorry, but I'm not going—"

As he fell limply across the desk, Erik Palmer knew dimly that the illumination panels flickered desperately, but all was lost in a red, searing world of heat and agonizing, tearing pain. The parchflex under his head shriveled in the heat. His very consciousness seemed to recede up some flaming, pain-tunnel, although he know distantly that he was writhing and twisting in the bucket seat as muscles jerked and knotted wildly. And then, suddenly as it had begun, it was over. In the blessed coolness, his tortured body subsided. It was minutes, however, before he could lift his face from the metal table top. The room was filled with the smell of

scorched cloth. It was an effort to turn to where Feris lay sprawled against the bulkhead, still twitching slightly. He was watching dully when the commander's eyes opened. They stared at one another, unable to move.

"The Macs almost went under," rasped Palmer. His throat ached horribly. "God only knows how Maintenance ever managed to drag them back."

He fought to his feet and half fell across the room to Feris. "Don't you see?" he grated harshly at the commander. "Another one of those will finish us off. By all rights, we should be dead now. There's certainly nothing to lose by trying my scheme."

Feris' lips moved, but only a harsh noise came forth. He nodded weakly.

It was a work of minutes for the sweating crew, groping in the blistering shimmering haze, to throw together the chamber. It was built of heavy slabs of metal, fused together at the edges. Thick cables ran from the multiple electrodes to conduits which led directly to the Mac drains. Others ran to the grounding circuits. Every sampling chamber on the *Emerald* had been worked with feverish haste to supply the thousands of pounds of heavy, glossy rock that now crammed the chamber almost to the evacuation vents. As the pumps went swiftly to work, Palmer turned to Feris. The older man was almost done for. His skin was dry, haggard, and hung in unhealthy

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folds. His eyes were closed and he was slumped unheeding against the hot metal bulkhead. He forced open his eyelids as Palmer spoke:

"We're just about ready. The idea, of course, is that this gadget will act as a cushion to ground any back-surge without knocking us out of this world." He glanced back at the chambers. A man at the pumps signaled. "All right. Clear the room."

Feris and Palmer were the last to step through the teleport screen into Control. The latter reflected that, curious as he was about what would take place there, he had no intention of being present when the first surge came through. He cut off the teleport, made certain that the compartment was completely shielded and insulated from the rest of the *Emerald* and connected directly to outside ground. Finally he turned and nodded to Feris:

"Let's go up."

The *Emerald's* drive lifted her gently. Cautiously, she felt her way upward. To Palmer, the hesitant trembling of the Mac potential was symbolic of the slipping clutch of the depths, out of whose realm they were slowly rising. Curious as he was about the efficacy of his crude excitation chamber, he hoped desperately that they would never find out. The minutes passed—the temperature gradually fell, and the irritating mist thinned. An hour slipped agonizingly by, and the potential fluctuations still remained within the capabilities of emergency maintenance.

But all was not well. If he had examined the instruments which registered the conductivity of the material through which the *Emerald* was passing, he would have noted the peculiar fact, that, instead of dropping off as the metallic content of the rock decreased, it had remained constant since the incident of the backfiring exciter. In fact, the *Emerald* was surrounded by what resembled nothing so much as a clinging electrostatic field.

But it was not. For out across a distance so vast that light could not cover the lifetime of a galaxy the impulse of the alarm had just that instant been received.

Then, in the time of the flicker of an eyelid, the *Emerald* slipped across into a denser stratum of rock. The potential steadied as power poured into the Macs, and then the density dropped again suddenly. The weakened ion shunts hesitated too long and the impatient surge leaped to the next lowest potential in Maintenance Sector—a tantalum-silver basketwork of thick cables walling in the shunt banks, which a praying crew of engineers, working side by side with their mechos, had thrown together scant minutes before. A fraction of an ultrasecond later, the surge hit the excitation chamber. No man can say exactly what happened there, for the intership stereos went out at the same instant.

The racing Emissaries, at that instant, were sighting far ahead the faint misty spot that was the Galaxy,

by light that had left it ten million years previously.

The Being awoke to terrible, exultant life. The tiny wisp of His life-field, which had hung so hesitantly around the hull of the *Emerald*, expanded under the outpouring energy from the collapsed nuclear structure of trillions upon trillions of very slightly unstable atoms. Like a fire in a tinder-dry forest, the outrushing wave of more-than-energy released the individually insignificant quanta in more and ever more nuclei. The planet leapt to an awful cosmic consciousness in a time so short that needles on the *Emerald's* indicators had no chance to kick over.

The Being expanded invisibly, almost instantaneously. Kindred atoms on Mars, Venus, the Moon, delivered up their contributions of life energy. Compass needles all over the solar system spun like propellers; magnetic and electrostatic instruments either crumpled needles against their pegs or twisted delicate suspensions into filigreed rubbish. If it had not been for the incredibly rapid expansion, the Earth would have been twisted from her orbit by the momentary interplay between her magnetic field and the Being's life-force. As it was, the dynamic equilibrium of the solar system was subjected to one sudden, terrible shock, and then left to its own resources. For the Being was then, a hundredth of a second later, at the boundary of the Galaxy and face to face with His hereditary antagonists.

The *Emerald* reached Calcutta hours later. Her instruments were mangled junk; she had found the depth port only by Palmer's laborious triangulation fixes on the seismic beacons. The story of her narrow scrape in the depths ran a very poor second in the news to reports from all over the System dealing with the terrific magnetic storm. The astrophysicists had conclusively shown that it was all the fault of the great subcoronal disturbance—an enormous crevice in the surface of the sun had sprayed the inner planets with a devastating sample of Sol's interior energy.

It would be a matter for tardy light, arriving in a thousand centuries, to tell the story of the suddenly missing Magellanic Clouds.

THE END.

Brass Tacks

Maybe the JET *not the V-2, was staggering around?*

Dear Mr. Campbell:

About the wavy V-2 trajectory reported by Jerry Shelton—it's my personal opinion that he was fooled by a gyroscope!

Of course V-2 is gyrostabilized; probably the control system was developed from the late Dr. Goddard's designs, but even if it were developed entirely from scratch it would still bear a family resemblance to them—Goddard's work is *basic* (so basic, in fact, that one of his earlier patents, about 1914, I believe, covers the liquid-fuel rocket.)

Goddard patented three distinct types of gyrocontrols for rockets. The first involves the use of gyros, pure but not so simple in its design—this control is suited only for spaceship use, in all probability. The second involves the use of deflection vanes introduced into the rocket exhaust. This is the type V-2 uses in a modified form. In the third type the entire tail of the rocket, motor and all, is swerved about as necessary. Obviously, the two latter types require that control be achieved by deflecting the exhaust as required at the proper times.

"Liquid-Propellant Rocket Development" contains two sets of movie stills taken during ascents of test-rockets using control method two. Those rockets weren't built for velocity—and consequently range—but just to test the mechanism; they never attained velocities of more than 750 mph. Under those conditions, then, the course corrections were rather mild and leisurely applied—the course wasn't jagged, but merely sinuous. In addition, the jet flare wasn't long enough to project appreciably beyond the rocket's tail.

However, V-2 doesn't—or didn't——mosey along at a miserable 750 per, but hit it up at speeds sufficient to produce plenty of compressibility effect, which would call for immediate and emphatic corrections in course if the rocket weren't to veer like an arrow in a typhoon.

And, the jet flare from a twenty-six ton thrust motor being rather long, the course corrections constantly swerving the jet to one side and the other would probably make it look as though the rocket itself were describing an extremely irregular trajectory.

From where I stand it looks as though it would be impossible for the rocket itself to sashay about to any great extent—after all, it's a fairly lightly-constructed affair, and couldn't stay in one piece very long if it did.—Keith Buchanan, Box 148, Amsterdam, Ohio.

V-2 should have had that proximity fuse! Then its force would all have gone into air blast instead of uselessly digging a crater.

Dear Mr. Campbell:

The wavering, unsteady flight path of a V-2 rocket bomb as reported in a letter from Jerry Shelton in the October issue is very interesting. You requested comments, so here are some from an aeronautical engineer.

You mentioned that the violent continuous-explosion process in the combustion chamber would lead to irregular thrust. The wavering flight referred to by Mr. Shelton seems to be a yawing or deviation of the V-2 off its course and subsequent return to it. I would suspect that the aerodynamics of the bomb itself and the mechanics of the gyro control mechanism would be the primary causes of the irregular flight, with the unsteady thrust being an aggravating factor.

The body of the V-2 is a sharp-nosed streamline body of revolution with a truncated tail. This form is directionally unstable at subsonic and supersonic speeds, so the V-2 is stabilized by four fins mounted on the aft portion of the body, and is guided by aerodynamic control surfaces hinged at the trailing edges of the stabilizing fins. At supersonic speeds, the control surfaces are in the extensive, turbulent wake of the fins and their effectiveness in guiding or turning the V-2 is considerably reduced below that at subsonic speeds. Directional control in the power-on condition is achieved by small control surfaces lying in the rocket jet. These may not be very effective; especially after the hot, corrosive jet has been playing on them for a little time.

The control surfaces are actuated by gyroscopes. Any angular deviation from the desired path brings about a correcting movement of the control surfaces and the V-2 is brought back to its original course. There must be a definite, though small, angular deviation before the gyroscopes initiate the correcting motion. This time-lag in the control mechanism, at the terrific speed of the rocket bomb, might result in an appreciable deviation from a smooth course.

The unsteady thrust is an aggravating factor in the already unsteady flight, as the effectiveness of the control surfaces in the rocket jet is a function of the jet speed. Suppose that the control surfaces were deflected during a short period of low thrust. Then the deviation from

the course would not be corrected as rapidly as usual, and the V-2 would go off course further than usual before being brought back again. Also, the unsteady thrust would give varying frictional forces on the gyroscope gimbal bearings and other bearings in the control system, resulting in unsteady operation of the controls and irregular course corrections. I have heard that some V-2's and other guided missiles have crashed untimely because of bugs in the individual control mechanisms.

It may be that the V-2 seen by Mr. Shelton was a poor example of the type and that others fly more smoothly. At any rate, the mechanical difficulties can be solved, and the unsteady thrust can probably be ironed out. So I don't think that future rocket passengers will be badly shaken up. The guided-missile research now being done will give the next answers, unless it is beaten to the press by the findings of some of the technical representatives of the United Nations in Germany.—Douglas A. King, 406 Armistead Avenue, Hampton, Virginia.

Now you're thinking of "Gather, Darkness!"

Dear Mr. Campbell:

From L. Adams Beck, quoting Lao Tsu, the great Chinese mystic:

". . . These two things, the spiritual and the material, though we call them by different names, are one and the same in their origin. This sameness is a mystery, the mystery of the mysteries. It is the gate of all that is subtle and wonderful."

From "World of Ā," ASF, October 1945.

". . . . It might indeed be said that science is striving to force similarity because only thus—."

From "The Cream of the Jest," by Cabell. Chapter, Evolution of a Vestryman.

"But Kennaston bemused himself with following out the notion that life was trying to evolve symmetry —It was this course of speculation which converted Kennaston to an abiding faith in Christianity."

Does the curious similarity of these quotations foreshadow the scientist taking holy orders, with acolytes swinging microscopes instead of thuribles, and that a slide rule is to be handled with reverential awe?—C. R. Wells, 35 West Ninth Street, New York 11, N. Y.

Not all Congressmen have even bothered to read the Smyth Report! Wonder if your representative has?

Dear Sir:

I have just read your editorial in the November issue of Astounding and I believe that it is something that should be read by everybody. That the vast majority of the people of the United States, and of the world, have not the slightest realization of the implications in the atomic bomb is evident to anyone who reads the daily papers. Congress seems to think that the way

to preserve peace is to prevent United States scientists from talking, thinking or working on any aspect of atomic energy without the consent and guidance of the Army.

That people must wake up is essential—if we value our lives! I think, therefore, that since the only thinking on the subject that is available is in the realm of science-fiction—which has ceased to be fiction—these stories should be available to the public.

Yes—what I'm suggesting is a reprint of the tales mentioned in your editorial—and any others which you deem important—all of them to be introduced by your editorial.

If only a few people are frightened into doing something about the present situation, the project would be worthwhile. (It also might be the source of some revenue to the publishers.)

We are in a period where the only people who *know* the possibilities of atomic power are gagged by the espionage act. They can't arouse people to the danger of thinking in our old ways.

Someone must arouse those in power before it is too late.

I'm frightened!—Roy V. Hughson, 1412 Caton Avenue, Brooklyn 26, New York.

The Moon would make a wonderful O. P.!

Dear Mr. Campbell:

I agree with Mr. Streiff's letter in October Brass Tacks, but since the letter was written things in the world have changed considerably; namely Atomic Energy.

With the demonstration of Atomic Energy as it is used now, there is, or should be an entirely new viewpoint toward the rocket or spaceship in the near future.

I am not sure how practical it would be to use the Moon for a future military base but with only one side toward the Earth at all times, bombing out such a base located on this rear side would be almost impossible, at least without highly perfected spaceships. Construction and details of ships meant only to carry materials and personnel, possibly only one way, would be much simpler. The difference in gravity between the Earth and the Moon would put the odds in favor of the Moon based ship in times of combat.

On the other hand, an enemy force based on the Moon could wait for his target to come into view and aim his torpedoes accordingly. Naturally these torpedoes would have a war head using atomic energy and consequently a far greater damage area than old type bombs or even "old" type atomic bombs.

Just the thought of the Moon as an offensive military base should cause the responsible persons to push the development of a practical spaceship. We can not let basic patents, psychological reasons or anything else stand in our way. The nation who controls the Moon in the future will control the Earth too.—William S. Lindsay.

Concerning The Atomic War

(*Continued from page 5*)

out a little better, in relative position, than he went in.

The atomic bomb lauching sites must, of course, be absolutely secret sites. Probably even the personnel of the stations won't be allowed to know where they are stationed, until war strikes. The bomb sites, incidentally, will not be able to use radar directly; radar works on the principle of shouting and waiting for the echo, and nothing is quite so easy to locate—and annihilate with atomic bombs—as a radar station. Instead, infrared detection devices, operating on the natural, inevitable radiation of the enemy device, will be the main reliance for location. Infrared detection was enormously improved during the recent war. The Nazis, who failed miserably in microwave radar, concentrated on infrared, and made more progress on that line than we did.

To communicate with each other, and with the outside world, the secret sites cannot use any ordinary transmitters. Perhaps some sort of tight-beam link to a series of distant transmitters, so phased and so excited, and so varied in amplitude as to give any direction finding equipment the impression that they are one single station, moving about the country erratically and at enormous speed, would be the answer.

The bomb launching stations themselves would not simply be located underground. Any place in which men must work in health and efficiency must be heated. Heat escapes, and warms the ground above. Modern infrared detectors could spot a buried fortress by the infrared radiation of the overlying rock.

But there are various dodges to overcome this. A station under the lake formed by Boulder Dam, for instance, wouldn't reveal itself; the water of the Colorado River would wash the heat away. A station under a known hot-springs area wouldn't be suspected. And no radiation of heat could escape from a station under an Alaskan glacier. On Hawaii, a station placed near one of the volcanoes might well pass undetected.

As we've said, hundreds, even thousands of feet of rock, do not constitute a barrier impenetrable to atomic bombs—if the bombs are simply designed to dig out that retreat. But rock in fairly thick layers can serve as successful camouflage, and protection against chance near-misses. Nothing on Earth—nor the Earth itself—can be protection against a determined, directed attack.

Atomic science today is a long, long way from the situation E. E. Smith proposes in his Galactic Patrol series. We can not shield out, ground out, or otherwise entirely eliminate atomic radiation from an active uranium pile. Somewhere, there must be an escape for waste products, gases and cooling water and byproducts. It seems rather doubtful that a uranium pile can be made proof against detection by ground and/or air spies.

Incidentally, in the suggested situation, whatever nation the United States Atomic Bomb Service finally selected as the aggressor would be subjected to a course of annihilation that would make the Roman treatment of Carthage picayunish. Not only the United States, but every other nation would automatically and instantly—in a literally hysterical hurry—atomic bomb its every city, town, village, hamlet, cross-roads store, and farm.

Which would be a very salutory thing.

If the right nation were chosen as the villain. But it would be very hard for the remaining Americans to be calm, judicial, and careful in their decisions and weighing of evidence at that moment.

THE EDITOR.

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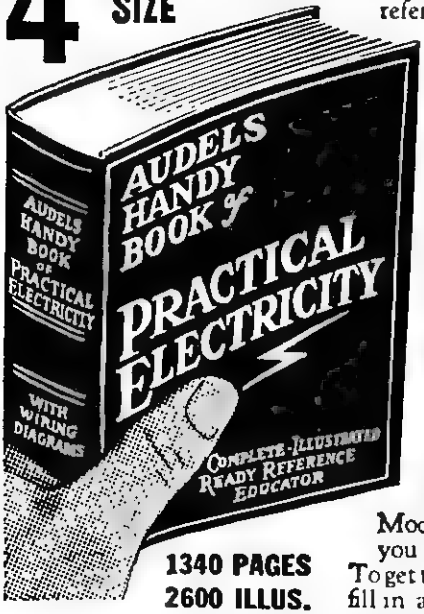
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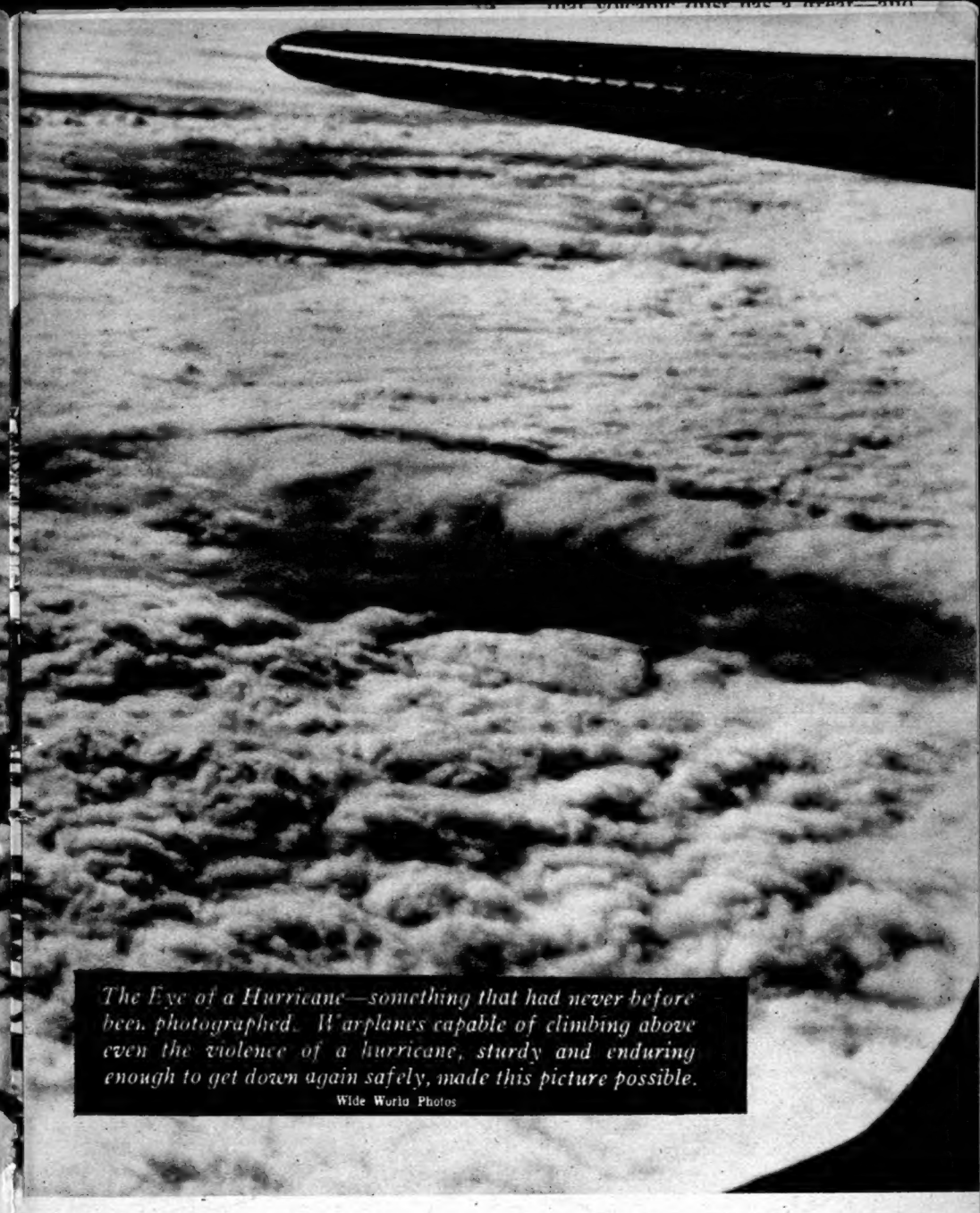
In his great work, "The Golden Bough," Frazer devotes several chapters to the fire-ceremonies of early peoples. He reviews the solar theory of Wilhelm Mannhardt—that the purpose of these frequently rather grim proceedings was to rekindle the fire of the sun, by sympathetic magic, so as to insure the passing of winter, the rebirth of vegetation, and the renewed fertility of the soil and of women.

That seems plausible, although Frazer himself prefers the purification theory of Westermarck—that the fires were intended to destroy witches and such-like evil beings. The two views are not really contradictory, however, as Frazer says: both may be partly true.

The Beltane fires are a typical example of these fire rites. As still practiced in the central Highlands of Scotland in the eighteenth century, they were a feeble but significant reflection of the rituals of the Druids in the dark forests of all prehistoric Europe. Beltane means fire of Bel or Baal, as a footnote in "The Golden Bough" suggests, and Baal in Gaelic means ball or globe; probably the ceremony was originally a solar rite.

The time of the Beltane fires was May 1st. The fire was kindled in a sacred spot on a hill. A sacramental cake was baked, and the blindfolded worshipers took pieces of it. The luckless one who drew a blackened piece became the Beltane carline. In the eighteenth century the burning of the carline was merely symbolic, but in earlier times he wasn't so fortunate.



The Eye of a Hurricane—something that had never before been photographed. Warplanes capable of climbing above even the violence of a hurricane, sturdy and enduring enough to get down again safely, made this picture possible.
Wide World Photos

When a full-fledged tropical storm strikes, it unleashes more energy than did the explosion of the first atomic bomb. It's less devastating only because it lasts longer

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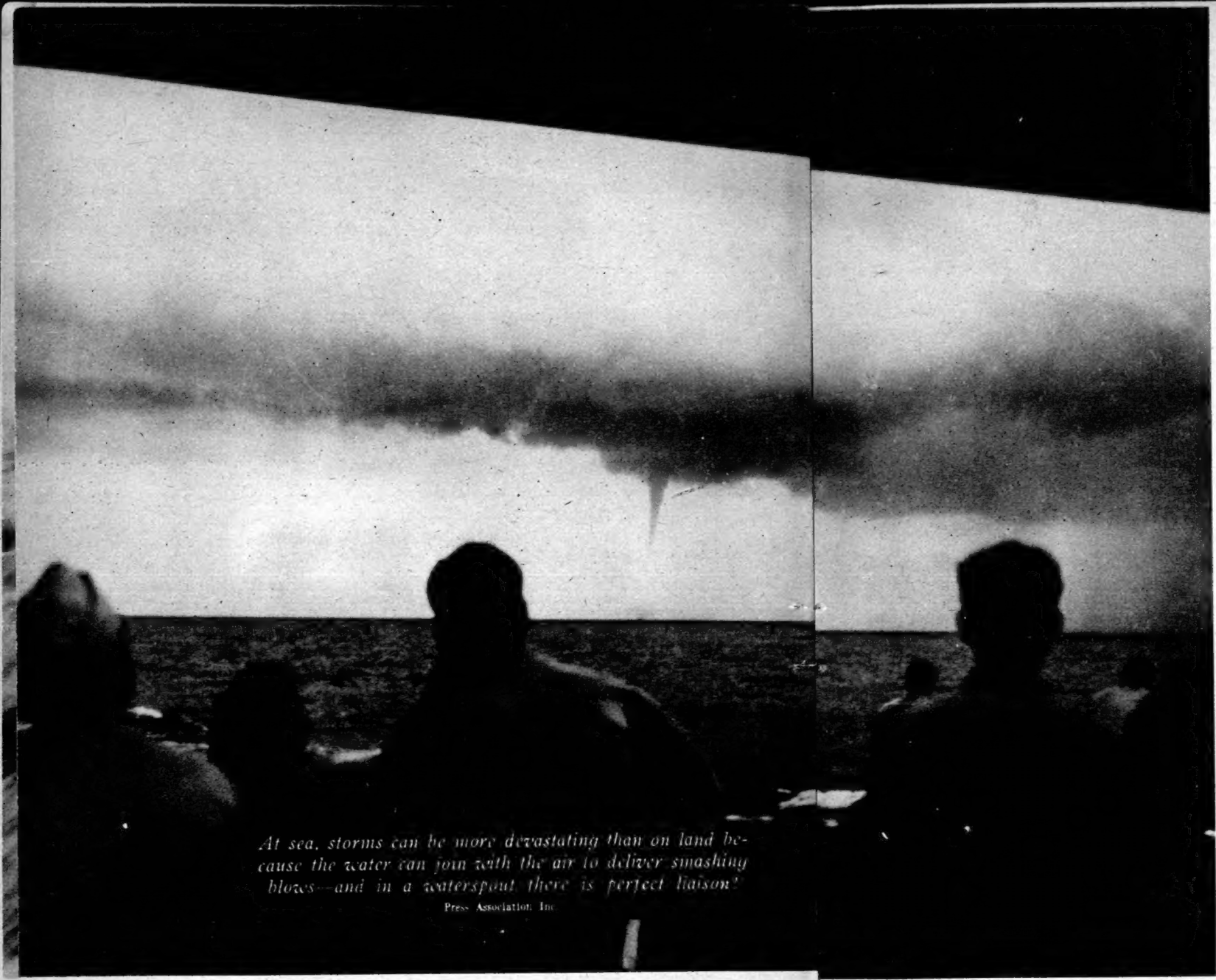
ambiguous terms, so as to cover as many different outcomes as possible.

There is a curious likeness between the forecaster coloring the precipitation areas on his prognostic charts, where he thinks it will rain tomorrow, and the witch doctor burning a small doll made to represent a man who will probably die tomorrow. Unfortunately for the forecaster, however, the elements are not so responsive to suggestion as the frightened savage.

Such magical efforts to control as well as forecast the future are falling into disrepute, but the idea survives in the common joke about the weather man making the weather. When the arid western states are drought-stricken, public prayers for rain are offered, and sometimes an ambitious modern rain-maker will try burning mysterious chemicals in a tower—maybe it will rain, anyhow, and what has he got to lose?

The first part of this article discussed the present state of weather science and the fine art of weather prediction. Now, forecaster-wise, we shall take a speculative glance at the future.

Will the Weather Bureau ever be able to publish a thick annual volume, with some such title as this: "World Weather and Climate Ephemeris for 1999, with Hourly Temperatures, Dew Points, Ceiling Heights, Visibilities, and Precipitation for Eighty Selected Stations, with Auxiliary Charts Showing Winds Aloft, Cloud Cover, Hazards



At sea, storms can be more devastating than on land because the water can join with the air to deliver smashing blows—and in a waterspout there is perfect liaison!

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better to understand and forecast our own.

Besides variations in the sun's actual radiation, there are several other factors which influence the amount which we receive, and its effect. There is a regular change in the perihelion phase of the Earth's orbit, with a period of about twenty-one-thousand years.

At present, the Earth is nearest the sun about January 1st, receiving about seven percent more radiation than at aphelion, during our summer. Consequently, our winters tend to be short and warm in the northern hemisphere, and long and cool in the southern hemisphere —when the Earth is most distant from the sun, and moving most slowly in its orbit.

Croll's famous theory of the glacial ages associated them with slow changes in the eccentricity of the Earth's orbit, which would increase that effect. Ice caps might tend to build in the hemisphere subject to long cold winters—no such effect is now evident, partly because of the maritime climate of the southern hemisphere. But, as Humphries says, that theory requires that the ice ages occur alternately in the two hemispheres, and with a period of twenty-one-thousand years, which does not fit the geologic evidence.

Besides such astronomical factors, there are, of course, slow changes in the extent and composition of the Earth's atmosphere. Carbon dioxide plays an important part in the "greenhouse effect"—freely admit-

But even with the handicap of slow delivery, the energy of the tropical storm can produce scenes in the United States reminiscent of Hiroshima.

Press Association Inc

that volcanic dust has a great—and unfavorable—effect on the weather.

Abnormally cold years appear to be associated with volcanic eruptions. Pyrheliometer records show that, during the years 1885, 1903, and 1912, the surface of the Earth received less than ninety percent of average solar radiation. The great eruption of Krakatoa occurred in 1883. Pelée and Santa Maria erupted in 1902, and Colima in 1903. Katmai exploded June 6, 1912.

The "greenhouse effect" of water vapor and carbon dioxide was mentioned above. But the fine volcanic dust which fills the stratosphere after a great eruption, causing red spectacular sunsets for many months, has just the opposite effect—the warming rays of the sun are shut away from the surface, while the Earth's own radiation can escape freely.

Humphries describes this cooling effect in detail. The average size of the dust particles can be calculated from the fact that they cause a reddish solar corona—observed in the years 1883, 1902, and 1912—known as Bishop's ring. From the dimensions of this ring, Pernter calculated an average diameter of 1.85 microns for this particle—a size equal to three or four wave-lengths of visible light.

Such particles settle very slowly in the dry stratosphere. Humphries finds that spherical sand grains of that size would require a year to sink from a height of thirty-five kilometers to the base of the stratosphere. Actually, he says, the finer